FIFTY CENTS

PACIFIC DISCOVERY

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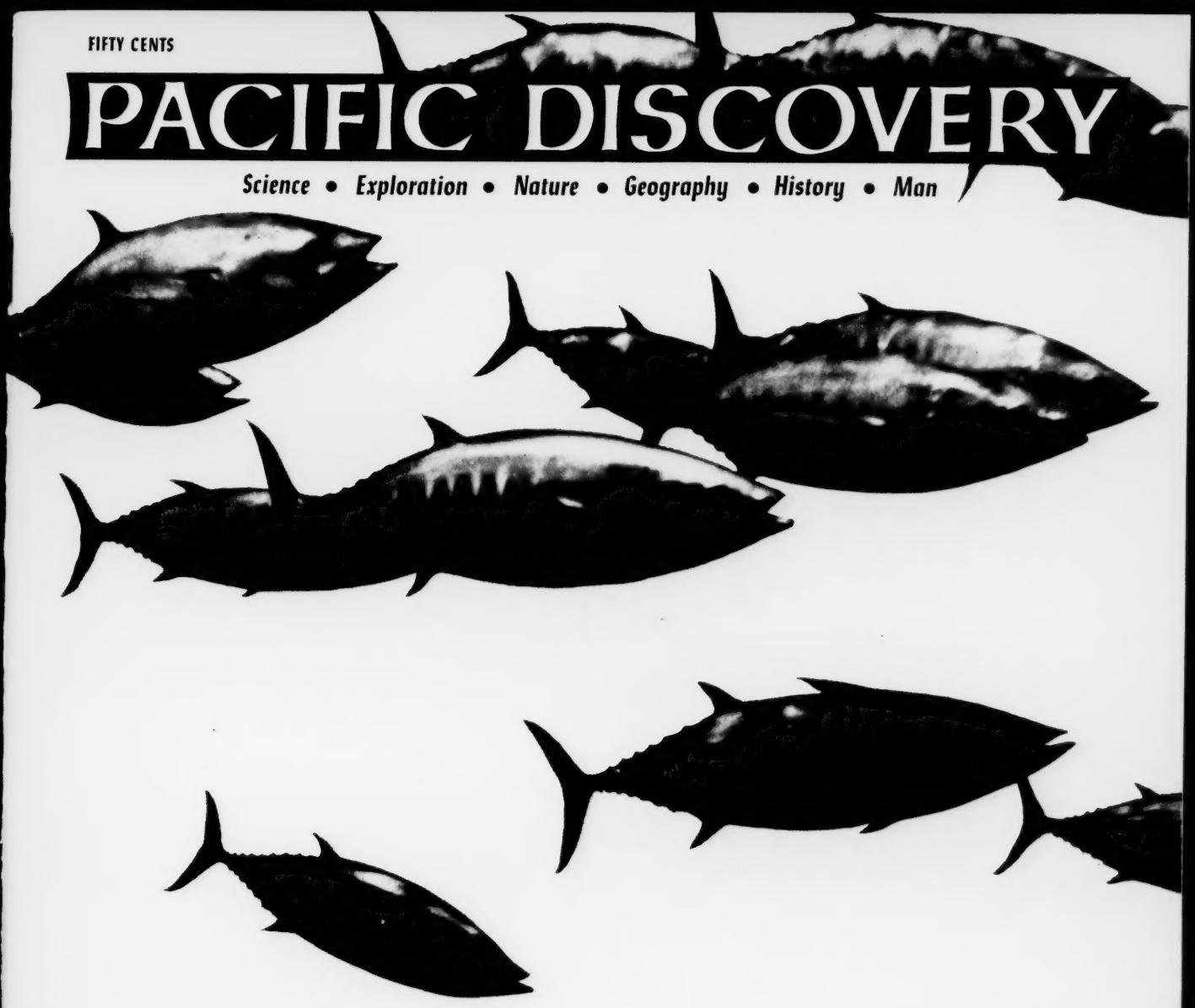

WITH A JAPANESE WHALING FLEET IN THE ANTARCTIC OCEAN

HOW THINGS IN NATURE 'TAKE UP SPACE'

PUBLISHED BIMONTHLY BY THE
CALIFORNIA ACADEMY OF SCIENCES
VOLUME XIII · NUMBER 4

JULY–AUGUST 1960
VOLUME XIII • NUMBER 4

PACIFIC DISCOVERY

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PRE-DISCOVERY

PACIFIC DISCOVERY's readers doubtless wish as heartily as its editors do, that the magazine would cover more ground. Six issues a year with 32 pages each are not enough in which to fulfill all your desires, or all our plans. But since no publication can be all things to all people, and should not try to be, you can be thankful for, and we are unhesitant in commending to your attention, other journals which in one way or another partly fill our gaps. Sierra Club members among our readers (we are happy to know that there are many) appreciate in their *Bulletin* the specialized conservation and mountaineering news we could not hope to cover. The *Desert* magazine's specialty is handled in satisfying detail—we do not try or want to compete. Among other journals we could name there is one published in the Southwest, an appreciative mention of which, here, is long overdue. It is a quadrimestrial called *Landscape;* the editor-publisher is J. B. Jackson, the assistant editor, Sylvia Loomis. It is handsomely produced at The Rydal Press, Santa Fe. Inquiries and subscriptions (three issues a year, $2.50) should be addressed to Box 2149, Santa Fe, New Mexico. So much for business details (unsolicited, unpaid adv't). As each sparkling issue comes to our desk, our surprise at its continuing survival (it carries no advertising) is forgotten in our renewed gratification in the quality and importance of its contents. Glancing down the table under the subtitle "Magazine of Human Geography," we see Richard Sears, Edgar Anderson, Carl O. Sauer, Lawrence Halprin, Harold C. Bradley, Henry A. Wallace, and many others equally well known in certain contexts. What draws such a topflight band of contributors to this too little known medium of too small circulation? It is first of all, we dare say, the challenging honesty of purpose, and the worthiness of his purpose, of the dedicated publisher, who is certainly not in the venture to make money. What is this purpose? It is, as we see it in what is there, *to challenge:* to challenge mediocrity of concept in planning urban—or suburban—development; the political expediency that needlessly gores the lovely flank of a hill in the name of freeway "progress"; the idea (see page 1, opposite) that only man among living creatures has the right to propose terms for living. *Landscape* is responsible, in the freedom it possesses, only to the most enlightened conscience of civilized people. Being well balanced, it seeks also *to inform:* it may be of "Time and Place in Ancient America"; of the science of "Technogeography, or Planned Conservation"; of "The Meaning of the Japanese Garden." And *to explore*—ideas, emotions, places: the philosophy of man's place in nature; the experience of wilderness; the heart of Brazil to take a critical look at the new capital. A wide variety of ideas, of facts, of forecasts, of retrospection, of implications, of proposals for richer, saner living comes to graphic life in the beautifully illustrated pages of *Landscape.* It needs more readers, and the world needs more such media of expression.

PD'S AUTHORS

GUEST EDITORIALIST **Olaus J. Murie,** Director of The Wilderness Society, is a distinguished wildlife biologist, author, and artist. . . . ¶**Adolf Portmann** (thanks to J. B. Jackson for permission to quote from *Landscape*) is Director of the Zoological Institute of the University of Basle, Switzerland. . . . ¶Journalist **Clifford V. Harrington** is now in Japan; his home is Santa Clara, California. . . . ¶**Dr. Victor B. Scheffer,** who wrote on his specialty, fur seals, last issue, is a research biologist with the Fish and Wildlife Service in Seattle. . . . ¶Historian **Joseph L. Parkhurst, Jr.** lives in Colonia, New Jersey. . . . ¶Tucson, Arizona is headquarters for the Southwest free-lancing team of **Hiram L. and Annette R. Parent.** . . . ¶Nature Editor **Dr. Arthur C. Smith** teaches biological sciences at Alameda State College, Hayward. . . . ¶Morrison Planetarium Manager **George W. Bunton's** co-editor of ASTRONOMY, **O. Richard Norton,** is the newly appointed Assistant Curator of Astronomy at the Academy. D.G.K.

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SKIPJACK SCHOOL in Hawaiian waters. (For description and credits see page 20. See page 17 for another photo.)

Pacific Discovery is published bimonthly at Gillick Printing, Inc. by the California Academy of Sciences. Publication office: 2057 Center St., Berkeley 4. Editorial, Advertising and Circulation offices (to which *all* correspondence should be addressed): Golden Gate Park, San Francisco 18. Annual subscriptions: U.S., $3; Foreign, $3.50. Single copies, 50c. Members of the Academy subscribe through their dues. Entered as second-class matter, February 17, 1948, at the Post Office, Berkeley 4, Calif., under the act of August 24, 1912.

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A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

EDITORIAL

THE SCIENTIST AND SAGEBRUSH

FOR SOME TIME some of us have been apprehensive about the plan to use a herbicide to spray portions of our landscape to kill sagebrush. What damage is being done in the course of accomplishing the one objective of trying to produce grass?

In the fall of 1959 a group of us looked over a large area on upper Green River valley in Wyoming, on which the Forest Service had sprayed poison. Of course the sage was dead. So was everything else. Certain aspens, and the evergreen trees at the edge of the forest, were affected, and the willows were gone. One pond, where the beavers were living, had its bordering willows killed. These were the only food available to the beavers. Now they must die or somehow get out of there, if there is any other place to which they can move. Moose also had fed out there in the open in winter, when the willows were alive.

In some sage areas there is a great deal of bitterbrush, and each winter the moose go out in the open to feed on this shrub. Everything likes this bush; it may be fully as important as grass in the economy of wildlife in some places, and it is palatable to livestock.

We know that in winter mule deer must have a certain amount of browse in their diet in order to survive. In places I have seen them subsisting on sage, without which, in those places, they would die of malnutrition. We know that sage grouse simply must have sage in order to last through the winter. As far as the antelope are concerned, they live on sage plains. While I do not know of nutrition experiments with antelope, all the stomachs I have analyzed in Wyoming and Nevada contained sage, and sage is an important diet item in Montana.

Now—do we want this wildlife to survive? And who shall be allowed to make the decision?

Some stockmen are opposed to the killing of sage. One cattleman remarked: "What we need is not killing sage, but range management."

In 1952 there was published a book, *The Sage Grouse in Wyoming*, by Robert L. Patterson, who did his investigation as an employee of the Wyoming State Game Commission. Here was a biologist who not only studied the life history and ecology of the sage grouse, but also studied the ecology of the livestock and the other factors involved in the economy of the area. He states, and I am sure correctly, that browse is a valuable adjunct in the diet of domestic sheep and cattle as well as in that of moose, deer, antelope, and other wildlife species on the range. He proposes to meet all human needs and desires by adjusting the use of sage lands in ways that will allow the needs of livestock to be met and the wildlife to occupy the same area. This is working democracy, as advocated by a modern scientist.

Mr. Patterson received the award of the Wildlife Society for the outstanding publication of that year. His book has been ignored by other Federal technicians and administrators. But Mr. Patterson was an example of a scientist who related his findings to the multiple land use involved—and proposed a sensible remedy.

What we need today is not technicians pursuing a narrow line to achieve a simple goal—in this case supplying more grass for livestock. What we need desperately are scientists who accept social responsibility and who can envision the biotic complexity of managing land to serve many social needs.

OLAUS J. MURIE

Moose, Wyoming.

The invention of poisons . . .

IN CONSIDERING THE MENACE confronting our times in terms of the relationship between man and nature we must take into account that this particular menace has changed fundamentally from what it was in past generations. In earlier times nature menaced man, now it is man who menaces nature. Previously man had to defend himself against natural catastrophes, wild animals, outside influences of every sort, and had somehow to survive despite them. Today it is we who uproot and transform, who threaten nature. Humanity, it is true, has still to suffer from natural catastrophes, but the menace which we ourselves present to non-human nature is incomparably more ominous. . . .

Man is a creature endowed with insight and therefore destined to assume responsibility. That is why he can be called to account for what he has done. . . .

Our laws are almost entirely concerned with man and his products and his thought; they assume no responsibility for animals, for nature. Only the scantiest beginnings of laws to protect nature now exist. As we seem to see it, nature is an object to be transformed, to be made useful, to be exploited; but as far as our having any responsibility for it, most of us feel exempt.

Now, however, we have succeeded in releasing forces that directly threaten us—or at least that part of us which belongs to nature. The invention of poisons, the modern scientific discoveries are two-edged swords. . . .

ADOLF PORTMANN

From an editorial, "Man and Nature," Landscape, *Autumn 1958.*

"KUJIRA" 鯨

SIXTY-THREE SOUTH WITH THE JAPANESE WHALEMEN

Lookout climbing to whale catcher ship's crow's nest. Two more men go aloft when first whales are sighted. Because of the biting cold, the topmast watch is only two hours.

HIGH ABOVE THE WATERS of the Antarctic Ocean a solitary man stood precariously on the lurching bow platform of a whaling catcher ship. As he searched the empty waves of the frigid sea, his hand came to rest on the handle of the powerful whale gun mounted in front of him. Armed with an ugly, snub-nosed harpoon, the weapon was ready for an instant's pressure on the trigger.

Suddenly, three hundred yards off the port bow six mammoth finback whales surfaced. "Port!" the gunner shouted in English into a microphone taped to the handle of his weapon. On the open bridge amidships the helmsman repeated the order and spun the wheel hard over. The 115-foot vessel heeled drunkenly as it churned the water in a semicircle to the left.

The finbacks – same dark blue as the water – breathed several times then dived.

The gunner wheeled the cannon on its pivot, testing its movement repeatedly. He flexed his fingers and stamped his feet to warm them in the biting cold. Although he wore padded clothing and heavy felt boots, the blast of raw wind from the pack ice to the south knifed through him.

Behind the gunner, in the swaying crow's nest forty feet above the main deck four lookouts also scanned the wide expanse of water. One of them had first

sighted the clouds of mist on the horizon and set the helmsman that way. Now they clung to the trembling perch as it rocked through a 30-foot arc, searching without binoculars to narrow their fields of vision. The whales might come up in almost any direction and must be sighted before they dived again. Two of the four pivoted towards the stern of the vessel—the finbacks could have reversed their course.

Now a lookout shouted "Starboard!" into a microphone in the crow's nest. His keen eyes sighted the whales almost as soon as they surfaced. The animals had veered to the right. The 3,000-horsepower en-

A harvest of whales

ANTARCTIC WHALING is no limping relic of the past but a flourishing multimillion-dollar business which supplies thousands of tons of meat and oil for human consumption, besides numerous products for industry.

During the 1959–60 season the world's most important whaling nation, Norway, sent eight fleets to the Antarctic. Japan ranked second with six fleets; next came England with three, Russia with two, and Holland with one. The United States has not had a whaling fleet for many years, being rich in vegetable oils and well supplied with meat. Duties and high wages also have helped make whaling unprofitable for American concerns.

Pelagic whaling is governed by the International Whaling Commission representing many nations, which has set up rules and standards for the protection of whale populations. It has, for example, established killing seasons, minimum lengths, and other restrictions, such as one which forbids a gunner to kill a female swimming with young. It allocates each whaling nation a sector of the Antarctic Ocean to hunt in and allots it a maximum catch each season.

Five kinds of whale are hunted in the Antarctic: the sperm, a toothed whale; and the blue, finback, humpback, and sei, all baleen (whalebone) whales.

Before World War II the whale most regularly caught was the blue—largest creature ever known to have lived on land or sea, recorded at over 100 feet and still caught 80 to 90 feet long and weighing 100 to 136 tons—but in the last thirty years heavy killings have dwindled its numbers to a point where the Commission has had to shorten the catching season drastically. Even during the brief period when they may be taken, it is not easy now to find blue whales.

Of the others—looking now at Japan's whaling enterprise—the sperm whale oils and other products are considered inedible and put to industrial uses. It is the Antarctic finback that supplies most of the 100,000 tons of whale meat consumed annually in Japan, and the bulk of the edible oil. Blues and a few humpbacks furnish a small part. Japan sends edible whale oil by tanker directly to Europe, where it forms the basis for about 50 per cent of the margarine manufactured there. Blubber, rendered on factory ships, yields about 75 per cent oil, skeletal parts about 25 per cent.

Japan entered the Antarctic pelagic whaling game for the first time during the 1934–35 season, with one factory ship and five catchers. By the 1937–38 season her fleet had grown to four factory ships with thirty catchers; in 1939 she had her present total of six factory vessels which were served by fifty-five catchers. When in 1939–40 German commerce raiders had begun to disrupt Antarctic whaling, Japan was in strongest with ten factory and eighty-five catcher ships. By 1941 she was alone in the field—the fleets of all other nations had been forced out by the war, as hers of course was soon to be. When peace came, the Japanese quickly got whalers back into the Antarctic to secure desperately needed meat. Since then they have modernized and built up their whaling industry until it ranks second only to Norway's.

The modern seagoing factory fleet is a far cry from the shore whaling on Japan's home islands of three or four centuries ago. Old records show that boats were especially built for whaling from land stations as early as 1606. During those early years watchers on shore spotted the whales. Boats were launched in pursuit, the men trying to stab the monsters with spears. Towards the end of the 17th century, whalers of the southern island, Kyushu, took to capturing whales with nets. After snaring one, they stabbed it repeatedly with spears. When it was subdued, one active fellow would swim out from the flotilla and climb on top of the whale to cut a hole in its back. A rope was attached, the whale killed with swords, and towed in to land. About 1870 the Japanese adopted western methods but still operated from shore stations.

Japanese people had little use for the oil but prized the meat. Until two centuries ago they classed the whale as a fish. Good Shintoists and Buddhists ate it with clear conscience. Even after Japanese naturalists adopted the proper classification, the average person remained ignorant of it and continued the mammalian diet.

Only the back of a finback whale shows as it surfaces and dives in sheets of spray.

PHOTOS BY THE AUTHOR

gine sent the craft bounding in a tight circle across the water towards them. The gap narrowed to nearly a hundred yards, almost killing range.

The wind came back with renewed force to sneak icy fingers under the gunner's furlined cap and jacket. He spread his legs wider to steady himself against the buffeting gusts, his platform becoming a springboard as the ship headed directly into the waves.

Not trusting the whales' forward course, the lookouts kept turning. But in a moment, one of them spotted the first of the six huge bodies as it puffed to the surface directly ahead. "Steady," he shouted into the microphone. The whales were running straight.

The gunner stood still and tensed, concentrating on the point to which the whales seemed to be heading. The "half speed" order crackled over the loudspeaker. In the bowels of the ship the engine's throbbing slackened; the ship slid forward more slowly. "Stop engines" sounded. Vibrations ceased and the catcher glided along on momentum, not fighting the waves.

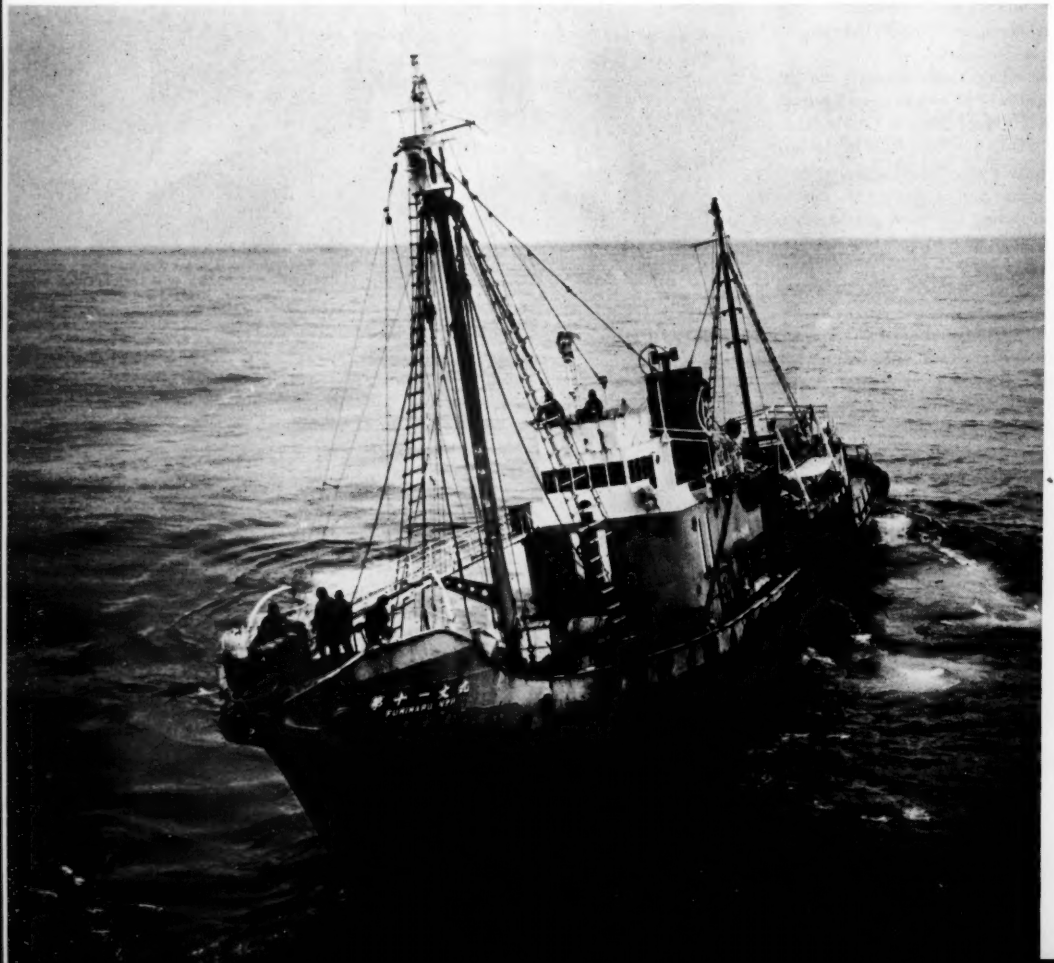
With a rush of tumbling water the first whale broke the surface fifty yards ahead of the ship. Behind it rose another dark body and then a third. The gunner crouched, sighted along the black triangular bar on top of his weapon towards the second finback. In one swift movement his right hand flew to the trigger and the 90-millimeter shell roared.

The 200-pound harpoon sliced across the water trailing its nylon leader. The line whirred from its coil in a basket below the gun, the heavy projectile burrowed deep into the side of the whale. Blubber brushed off a thin strand of rope holding back the harpoon's barbs which snapped out, gripping the animal securely.

As the diving whale jerked the line 600 grams of black powder exploded in the harpoon head, badly wounding the huge mammal. In agony now it continued its downward plunge, pulling out yards of reserve line from below decks.

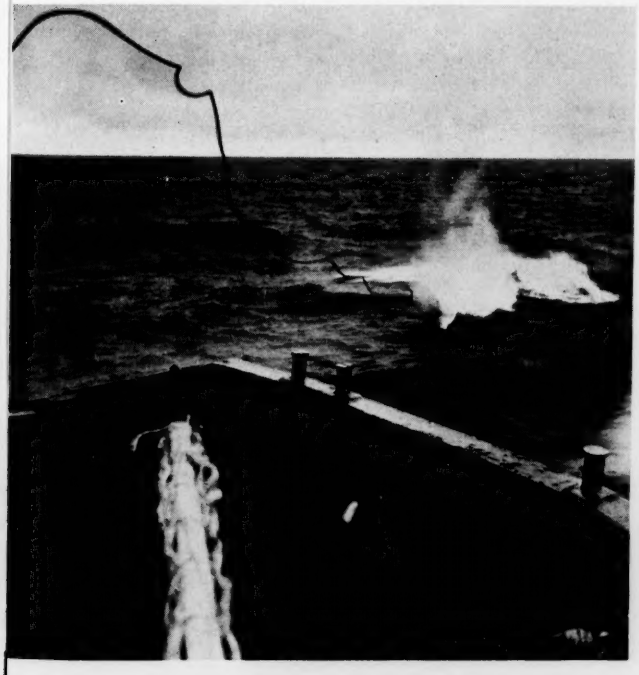
The ship had now come almost to a stop while the gunner stood in the bow watching the rope snake down into the water. He signaled the bridge with his hand; the white line shifted to a new angle. At the helm the captain rang engines and turned the ship to face the whale, the heavy line following the nylon leader still paying out from the hold in slithering spurts. Beneath the deck a giant spring connected to a block in the rigging took up jolts which could snap the line if their force were not checked.

Two men scrambled down the ladder from the crow's nest and ran forward over the narrow gangway to the bow platform. Others joined them. Hurriedly, the loading team swung the cannon around and locked it. Three men thrust in a new harpoon.



A catcher ship squares away to search for finback whales, the whale gun ready on its bow platform. Steering is from an open wheel deck amidships. She is built so high out of the water for maneuverability that her lower deck is frequently awash when she is rocked by waves. Lookouts scan the sea from the masthead crow's nest. A 3,000-horsepower engine drives the 600-ton vessel at a maximum speed of 17 knots. This is the *11 Fumi Maru* of the Taiyo Fishery Company of Tokyo.

Ready to fire (LEFT), the gunner lets go (ABOVE) with a 200-pound harpoon which trails a leader and line through air and water (BELOW) as it finds its target, a 50-ton surfacing finback whale, whose pointed dorsal fin can be seen to the right of the towering sheet of spray.



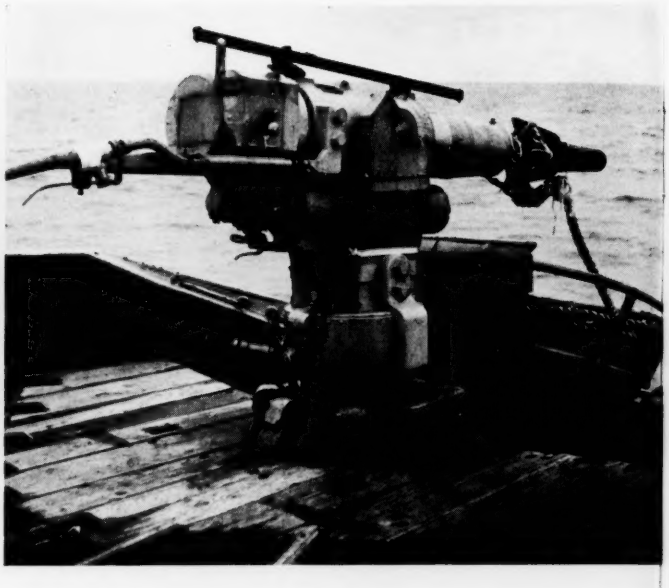
Another opened the breech, pulled the fired shell, and rammed in a live cartridge. A fifth, who had been pouring black powder into a new harpoon head, now screwed it into place. Two men stayed on the platform to coil a fresh leader in its basket. Then they all left and the gunner was alone again, with a second harpoon ready if he should need it.

On the main deck crewmen stood by a 90-horsepower winch. Soon the gunner signaled them to start reeling in the catch. But it came intermittently—the whale, still alive, made feeble but ponderous attempts to gain headway. Minutes later it rose to the surface in a pool of blood. Its white, grooved underside turned to the sky, its flippers ceased their spasmodic motion. The whale was dead.

Men hovering just off the platform now rushed forward again, grabbing up a long pole armed with a detachable hollow point and trailing a length of hose. Thrusting the tip deep into the whale's belly they started an air pump. The finback's underside ballooned out, stretching wide the accordion-like pleats. The great body remained floating on the surface of the sea.

Two men, meanwhile, were throwing a weighted line over the animal's tail and securing a heavy rope around it. To this they attached a buoy and a bamboo

← Reloading, crewmen secure the "snap-out" barbs with a small piece of line which will be brushed off when the head enters a whale.



→ Loaded whale gun ready for firing.

pole flying the ship's marker flag. After connecting a watertight automatic radio to guide in a gathering ship, they cast loose the dead whale. Later it would be retrieved and towed to the factory ship for processing.

THE FOREGOING is an account of the catching of one whale as we—my 19-year-old helper Nozaki Tsuneo and I—observed it aboard the catcher ship *16 Fumi Maru* operated in the Antarctic by the Taiyo Fishery Company of Japan. The routine we saw was to be repeated several hundred times before the ship's work was finished for the 1959–60 season. We had come more than 6,000 miles from Tokyo on a refrigerator ship to join the 16,000-ton factory ship *Nisshin Maru* and her flotilla of catchers and gatherers.

Now with one whale bagged and the ship in pursuit of the rest of the herd several miles away, the gunner and the captain went below to the tiny saloon for a quick breakfast. We followed and joined the officers in a meal of fried eggs, rice, soup, and plenty of raw whale meat laced with onions and soy sauce, washed down with cups of scalding green tea.

The gunner, actually senior officer to the captain, was Mamoru Watanabe, a robust, stocky fellow who had spent twenty-one of his forty years at sea, working up from deck hand to captain of a catcher and, after two years' apprenticeship, to gunner. In four Arctic and twelve Antarctic voyages he had shot nearly 2,000 whales, the longest an 89-foot blue. Each time he pulled the trigger of his whale gun and shot one of the more numerous finbacks, he provided at least ten tons of meat and a like weight of oil for the dinner tables of Japan and Europe.

"People who do not know about whale hunting think the gunner's work is easy," he said through an interpreter. "The target is so large and its speed relatively slow—five or six knots. But the hunt takes every bit of a gunner's instinct and skill, which he gets only from experience. Not only is the whale moving, but the hunting platform is pitching and rolling also. The whale is on the surface for short seconds at a time, and even then only the upper parts of its body show."

Watanabe explained—gesturing, with one hand the ship, the other the whale—how he orders the helmsman to keep slightly to one side of the animal. Then at the precise second which his "sixth sense" indicates, he sends a harpoon hurtling into the area towards the center of the whale's length, trying to hit one of its vital spots.

A raucous cry from the bridge interrupted this graphic demonstration. Gunner and captain rushed topside, tugging on jackets as they went. The ship had closed in on the rest of the whale herd. By the time we caught up, Watanabe and the skipper were side by side in their heated chairs on the open wheel deck. From time to time the gunner talked over the intercom to the lookouts in the crow's nest.

In a short while he walked leisurely down the ladder and over the gangway to his hunting platform. He kept up a running commentary via the loudspeaker as the ship neared the five remaining beasts. His first shot was true and within thirty minutes the dead whale was released, ready for pickup.

A finback is pulled in to the bow of the *16 Fumi Maru*.

The third whale appeared to be much larger than the rest. Again the first shot was good, but the explosion in the harpoon head failed to mortally wound this animal. The gunner had to send a second harpoon into its side when it had been pulled in close enough. Later he shot a third one, without line, to deliver the *coup de grace*. This old female proved to be 80 feet long when measured on the deck of the factory ship several hours later.

The ship sped after the other whales and Watanabe bagged two more. Then he went after the sixth, most elusive of the herd. After it sounded the first time and the ship turned to follow, the finback showed up next heading at right angles to the vessel. When we turned towards it again the whale disappeared for several minutes to come up at our stern, swimming in the opposite direction.

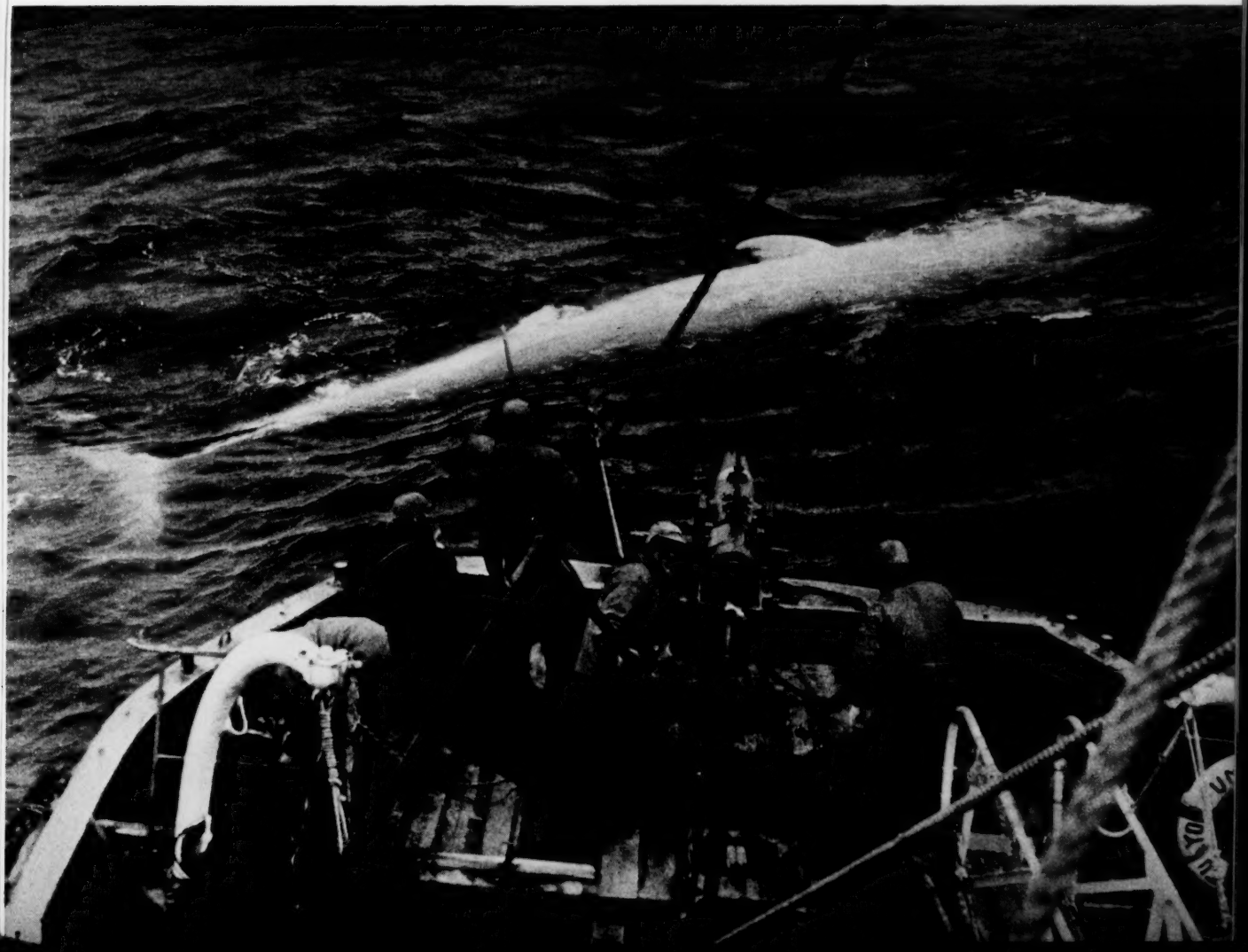
"Wise whale," the captain muttered in English.

This beast had become gunshy and apparently had learned to fear the rumble of the ship's engine. For many minutes the whale stayed in the depths, feeding, while the men kept up their vigil. Then it surfaced briefly, sounding within seconds. We were on its course for the moment, but this was not to last. Within five minutes it surfaced to starboard. We lost ground with each move.

But soon the continuing search paid off. Other whales were sighted in the distance. The gunner finally gave the order to go after them and leave the "Wise One" to his own devices. It was getting late, and stormy.

Watanabe had to bypass the first whale—a female with a baby swimming at her side. He nabbed the second one, bringing his day's score to six. Now he broke off the hunt. Night was almost upon us and the sea had grown so rough there was great danger on the hunting platform. If the gunner had been washed overboard by an unexpected wave, he would have perished in the frigid sea within five minutes.

As the gloom of the Antarctic night came, he went down to his cabin to snatch precious sleep. He would be wakened to start a new day's work as soon as there was light enough to see by. This dawn in the Antarctic was only three or four hours away.



to the
Maru.

THE GRAY-HAIRED JAPANESE SKIPPER handed me a pair of binoculars and pointed to two plumes of mist above the waters of the Antarctic Ocean a mile away.

"Kujira," he said, turning again to gaze out the window of the factory ship's bridge.

I hurriedly focused the glasses and spotted the dark shapes of two Antarctic whales. Their broad backs broke the surface and then the two beasts breathed, leaving clouds in the cold air. In one continuous forward rolling motion they sounded. Rings of foam on the water marked their passing. Their tails had not risen above the sea. Only their backs had been exposed, but from this brief appearance the captain identified the whales as finbacks, the most plentiful of the cetaceans caught in the Antarctic.

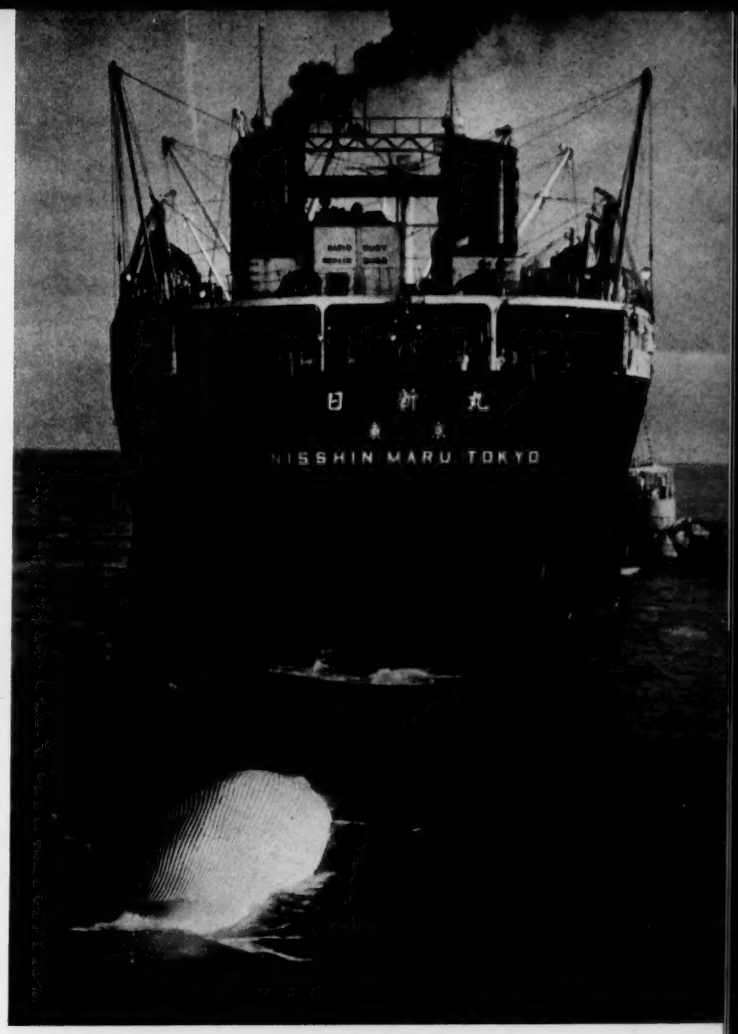
Aboard the *Nisshin Maru,* Nozaki and I were now to see what became of the whales which gatherers towed to a factory ship from where the catchers had marked and left them in the open sea. This giant vessel, 864 feet—nearly three football fields—long, was a floating industrial city, inhabited by four hundred officers, crewmen, and whale processors. The wide flensing deck became a turmoil of activity when whales were brought in. Below was the factory where blubber and other whale parts were reduced to oil and sundry byproducts.

Far beyond the horizon in a vast circle around the floating factory, the *16 Fumi Maru* and her sisters of the catcher flotilla were continuing to hunt. Now we could see first one then another of the gathering ships coming over the hump of the sea towards us.

From the high stern of the *Nisshin Maru* we watched crewmen lower a huge metal clamp over the tail of the first whale as it was drawn in by cable from the gatherer. Two giant steam winches were started and the slack on two thick wire cables was taken up, automatically closing the jaws of the clamp. Up the slipway and onto the flensing deck came the ponderous mammal.

↑ Gathering ship *Toshi Maru No.5* returns to the factory ship *Nisshin Maru* with three finback whales in tow. The catch is secured to the sides of the vessel with heavy-duty chains. Note that gatherers and catchers are identical vessels and may be fitted out to serve in either capacity as needed.

→ Three finbacks at the stern of the *Nisshin Maru* waiting to be hauled aboard. The ventral grooves expand as the whales fill their cavernous mouths with water to strain out the krill they feed on.



A whale is being worked to the slipway by winches.

Here a crew of warmly clad men armed with broad-bladed, long-handled knives made incisions into the whale above and below the mouth. Two men inserted hooks, and winches began peeling back large sections of blubber. When the meat beneath was exposed a gang of flensers began hacking it off in large chunks. These were chuted over the side at once, to waiting shuttle boats which sped them to a pair of refrigerator ships hove to a half mile away on either side of the *Nisshin Maru*.

Meanwhile, slabs of blubber went amidships from the flensing deck to be cut into smaller sections and shoved down openings to the sixteen revolving steam cookers on the factory deck below and rendered into oil. Forward, selected pieces of blubber were cut small for salting and eventual sale as whale bacon.

With incredible speed the first whale had been reduced to a skeleton. What remained of the carcass was chain-sawed and crosscut into small chunks which went into the cookers also for rendering. The liver had been removed and was being processed for precious vitamins. The intestines had been dumped over the side. Within twenty minutes a 40- or 50-ton whale had been cleared from the deck and a new one had taken its place. Such was the efficient process of modern whaling, to be repeated thousands of times before the Antarctic season ended in March and the fleets of the various nations stood northward for their home ports.

Our fleet, one of three owned by the Taiyo Fishery Company, the world's largest whaling concern, comprised the factory ship, nine catchers, three gatherers, and two refrigerator ships. Three other Japanese fleets were operated by several smaller companies. All had sailed south in early November.

While on the *Nisshin Maru* we stayed close to Tadayoshi Ichihara, a scientist from the Whales Research Institute of Tokyo. His job, as he explained it, was to gather information and specimens in the field, to be studied by his organization and others like it with a view to devising more effective measures for conserving the world's depleted whale population. Within the past few years the whaling industry has become well aware of the danger of fishing itself out of existence.

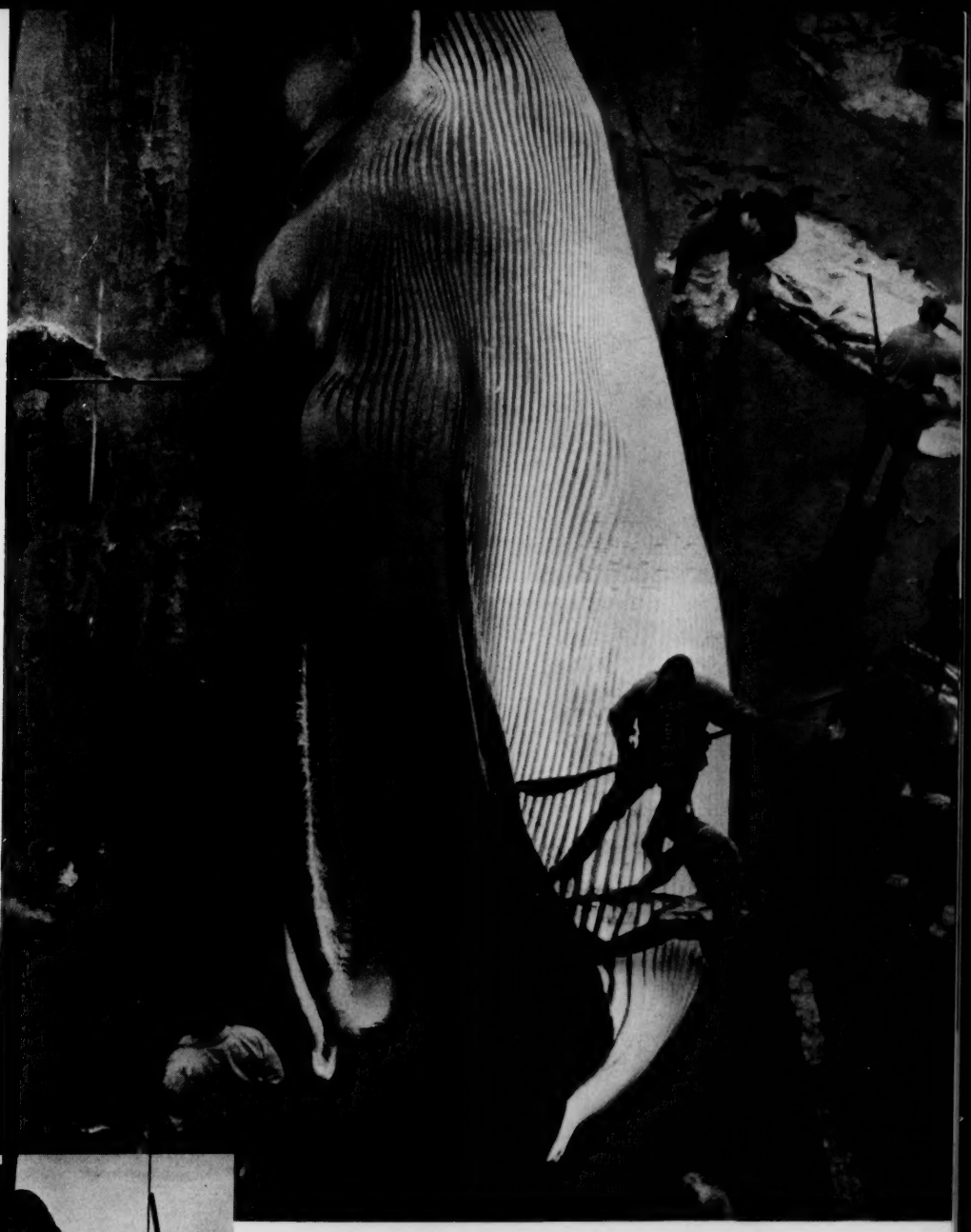
Enlightened self-interest has made modern whaling a carefully regulated industry. Aboard the *Nisshin Maru* were three Japanese Government inspectors assigned to the ship to see that international whaling agreements were observed. Regulations are based ultimately on studies of whale life histories, numbers, and distribution over the world's oceans. The men who make the studies, and those commissioned to enforce the regulations as well, have to be trained biologists. By dogging Ichihara as he worked, we began to learn something of the life and ways of whales.

One evening, after we had watched the last whale of the day disappear from the cold flensing deck, Ichihara clumped to our cabin in his spiked rubber boots and heavy work gear to pay a visit. Within minutes we were discussing whales, finbacks in particular because they—owing to the man-made scarcity of the larger blues—furnished the bulk of our catch.

Finbacks commonly run ten to fifteen feet shorter than the 80- to 90-foot blues, females averaging 65 feet, males 62 feet; an average female finback weighs about 45 tons. Ichihara noted that female baleen whales are slightly longer than males, while the opposite is true of sperm whales.

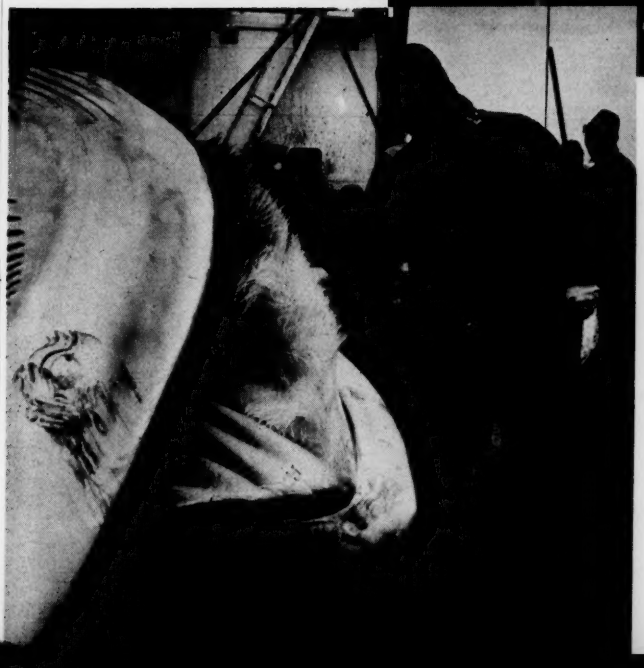
Like other baleen—or whalebone—whales, finbacks eat tiny shrimp-like creatures (*Euphausia*). The movements of these along with other plankton in the subsurface currents determine the travels of the baleen whales and, consequently, the courses of the whaling fleets. The whales swim through clouds of these krill, opening and closing their mouths. The water escapes through openings at the sides, leaving the *Euphausia*

It takes two powerful winches to haul a 45-ton whale up the slipway to the flensing deck. The whale is hardly aboard when flensers attack it with their long-handled flensing knives. Tiny figures of men at the far end of the deck give a good idea of the ship's length.



➢ Flensers prepare to slice into a finback's thick layer of blubber.

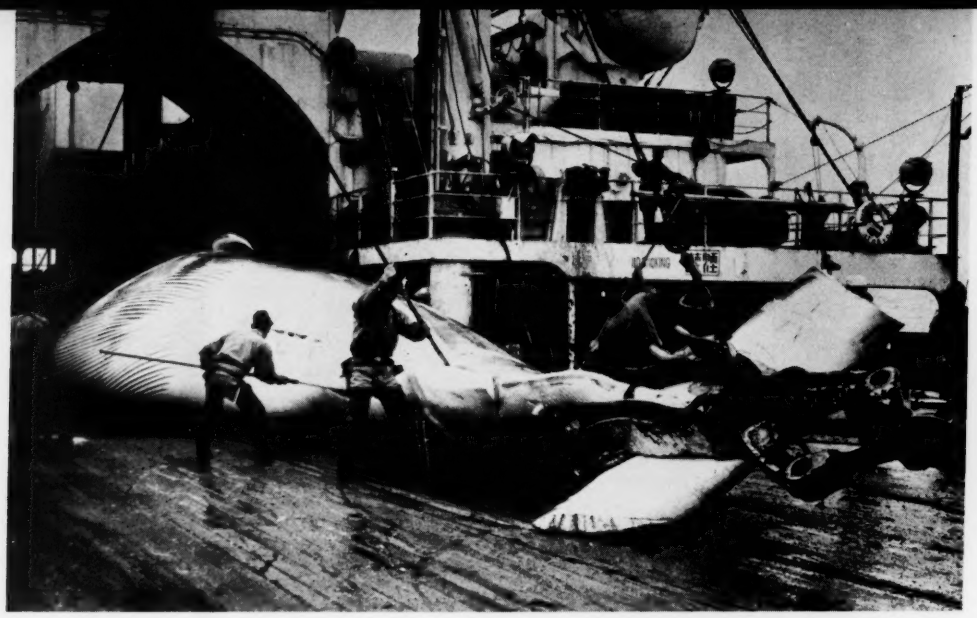
↓ Nozaki Tsuneo inspects the baleen or whalebone along the upper jaw of a finback. There are some 700 of these fibrous teeth making a giant "soup-strainer" to sieve out the tiny krill —shrimp-like animals— the whale feeds on.



caught on the hair-like edges of the baleen. Each finback is equipped with approximately 700 of these fibrous teeth which grow only on the upper jaw (the lower jaw is bare).

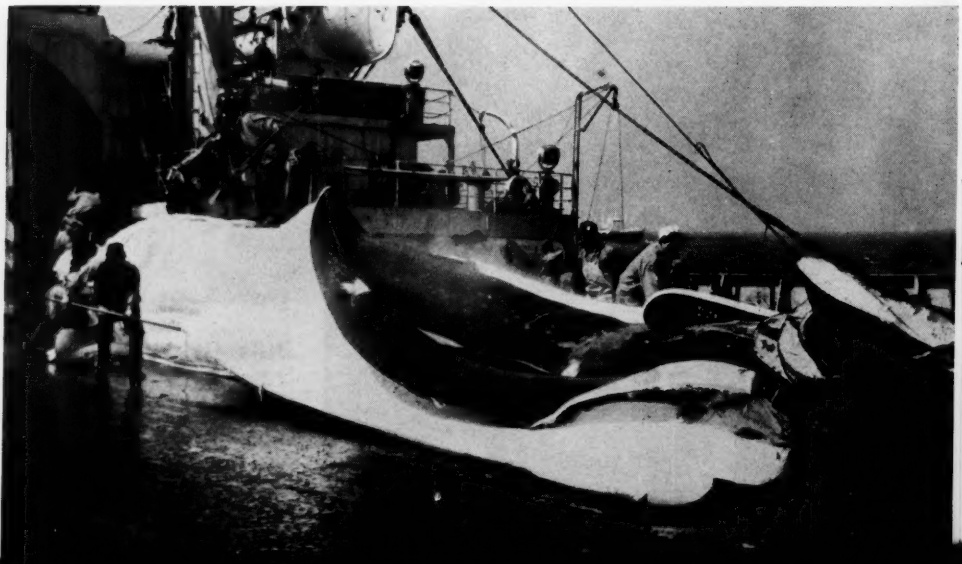
"It is strange," Ichihara said, "but on the right sides of their mouths the finbacks each have a section of white baleen—just for what purpose, is still a mystery."

Once on the flensing deck he showed us lines on the baleen which may be counted to give a fair indication of the whale's age. More accurate was the total

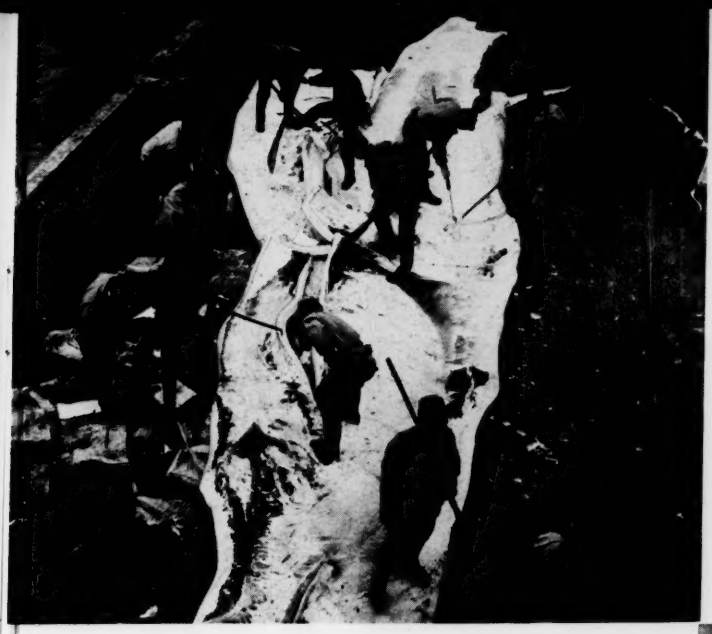


↑ Flensers start their cuts. Note the huge double-pronged grappling hook which pulls the whale aboard.

← A deck hand signals the winch operator. The mark on the whale's upturned tail-fin is the Japanese character for "six."

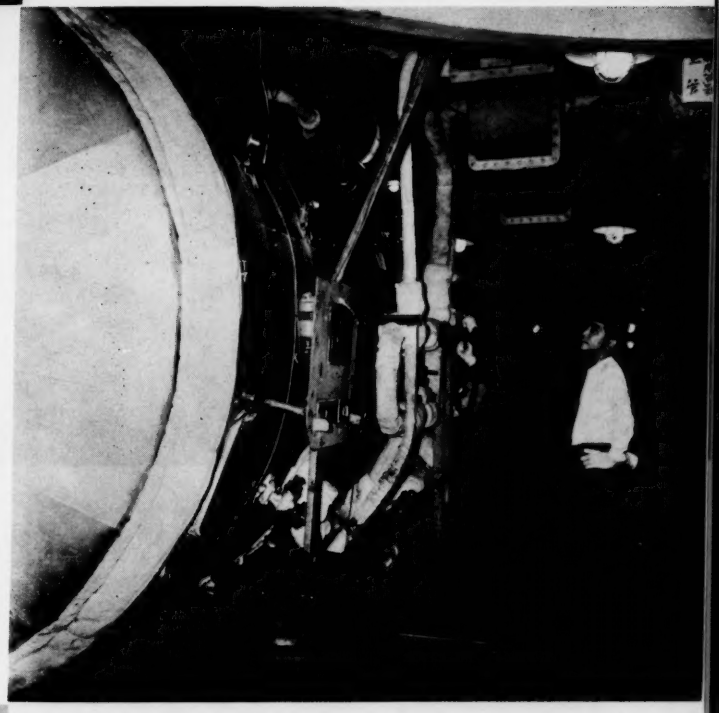


→ The blubber is peeled off like a jacket.



A giant slab of blubber is cut up by flensers for reduction to oil on the factory deck below.

One of 16 giant rotary steam cookers for reducing blubber and bones to edible oil.



of fine growth lines seen with a microscope—in the laboratory back in Tokyo—in sections of a kind of triangular plug he got out of the whales' ears.

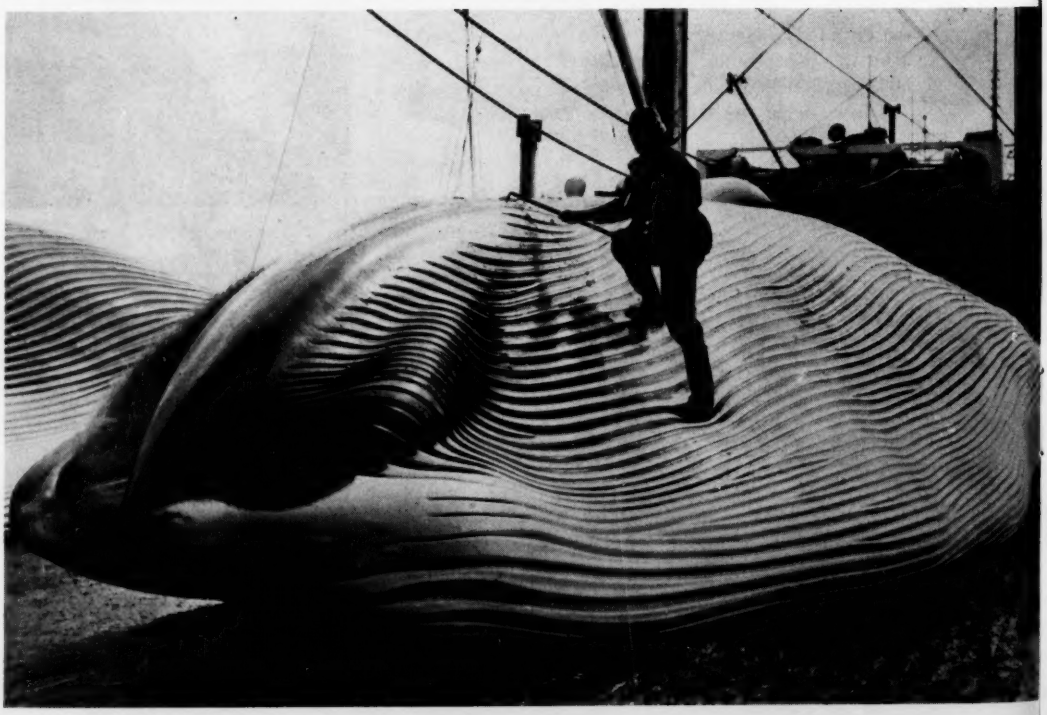
Another time, he led us to the spilled contents of one whale's four stomachs. He stooped and picked up a *Euphausia.* It was about two centimeters long. The whale had sieved out and swallowed hundreds of pounds of the tiny krill. Occasionally Ichihara and his assistant found a fetus for study. Nearly 65 per cent of the females caught during the season were carrying young.

"Finbacks are long distance travelers," he told us. "Every year they stay in the Antarctic for roughly six months, November till April—the warmer months in the south polar regions. Then they swim to the tropical waters to breed and give birth to their young." These whales are known to assemble in the vicinity of the Persian Gulf. Surveys in past years have revealed a heavy concentration of finbacks all the way from 50° to 100° E. longitude, north of the Equator.

The cycle of the finback whale from conception

Select portions of the blubber are cut out and sent below to the factory deck for salting down. It will be sold as whale bacon.

Tadayoshi Ichihara, biologist of the Whales Research Institute of Tokyo, measures a whale fetus while a Japanese Government inspector, Yoshigi Shigeta, takes notes on the *Nisshin Maru's* deck.



The author stands on the upturned underside of a finback whale aboard the *Nisshin Maru* in the Antarctic Ocean. He and Nozaki Tsuneo went as observers on the whaling voyage through the good offices of Taiyo officials Kenkichi Nakao, business manager of the 55-ship fleet, and Shigeo Takeda, in charge of whaling activities. Others—too many to name—had a part in arranging the trip for the two journalists.

Track of the author's whaling voyage from Tokyo Bay to the Antarctic.

through birth and early growth runs about two years. After their warm-water breeding they return in the fall to the Antarctic. The following summer, eleven and a half months later, they return to the temperate zone and the young are born. The babies are about 21 feet long at birth, weigh in at three tons. Usually there is only one baby at a time—but of 569 whales examined since the war eleven carried twin fetuses. Triple, quadruple, and even quintuple fetuses have been recorded.

After several months in the warm waters feeding on their mothers' milk, the young go with the herd back to the Antarctic. At weaning they are monsters of almost forty feet. By their fifth or sixth year they are mature, and under natural conditions they may live out a span approaching forty years.

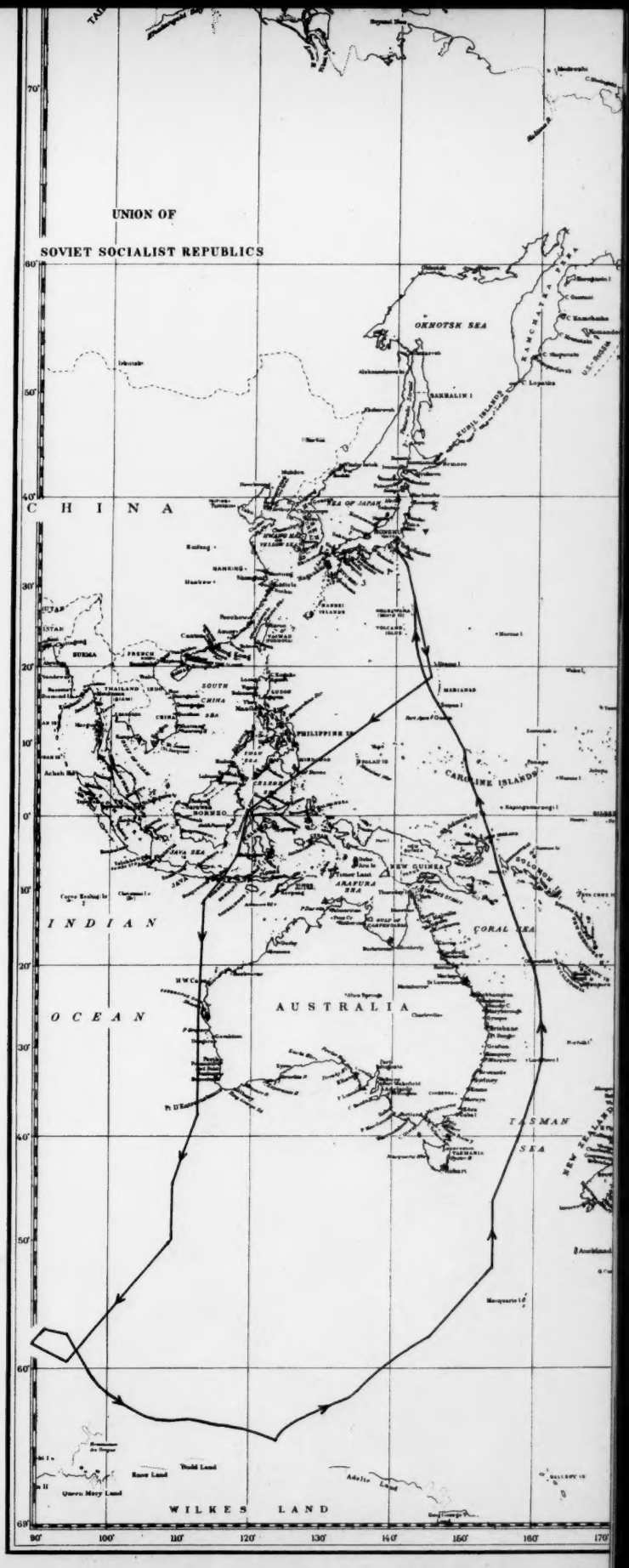
On the northbound trip the whales eat little, burning the fat they have deposited in the Antarctic time. They don't need this protective layer of blubber in the tropics, and they develop a new layer when they head south in the fall. In a pregnant female this grows to a thickness of 7 to 10 centimeters at the side of the dorsal fin where measurements are taken for scientific purposes.

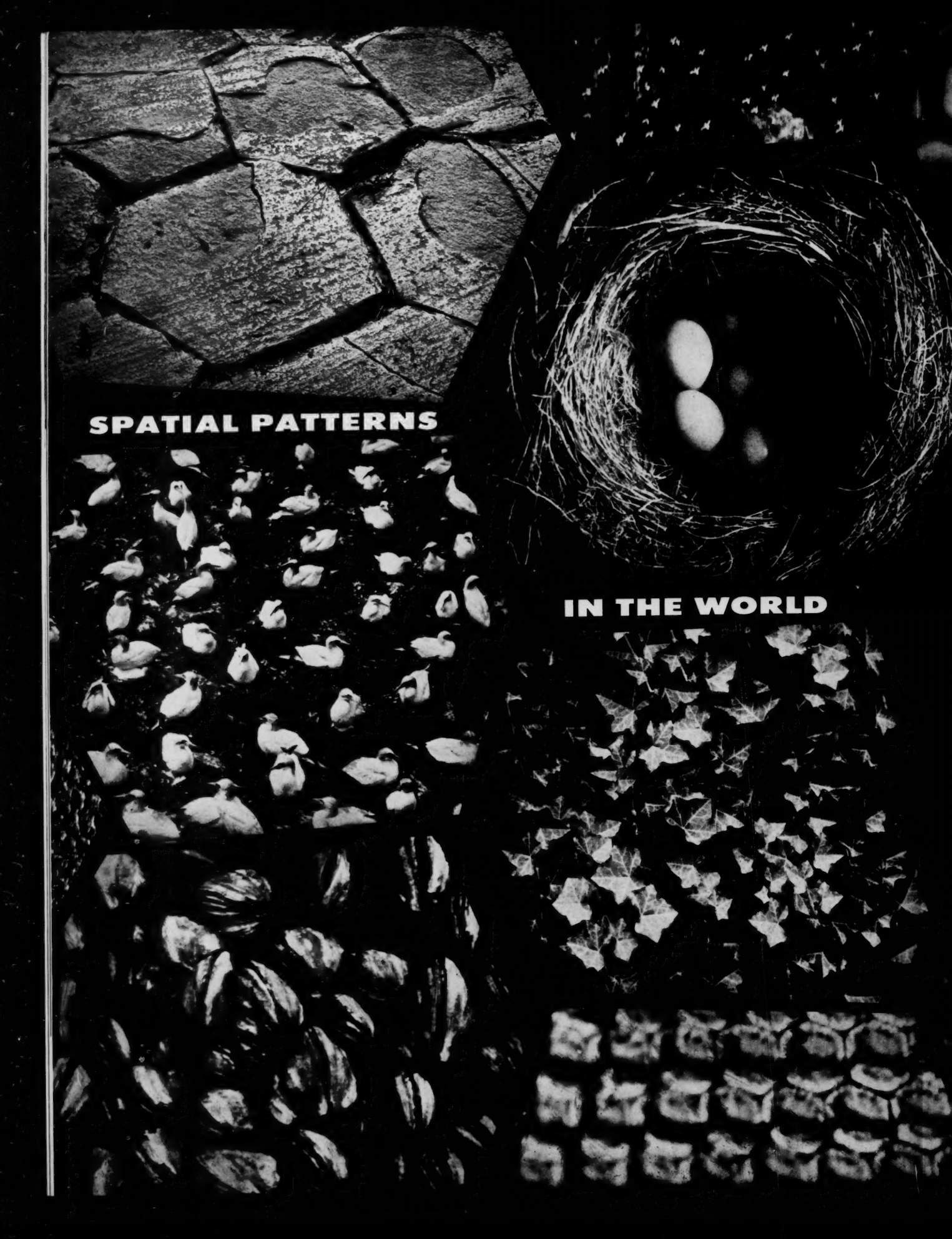
Whales are nearsighted, but this is no great handicap, at least in feeding: it is believed that they locate *Euphausia* by ear. The krill emit a high-pitched sound. From laboratory reconstructions of whale ear mechanisms scientists have figured that whales can tune in the krill frequency. Whales have no vocal chords.

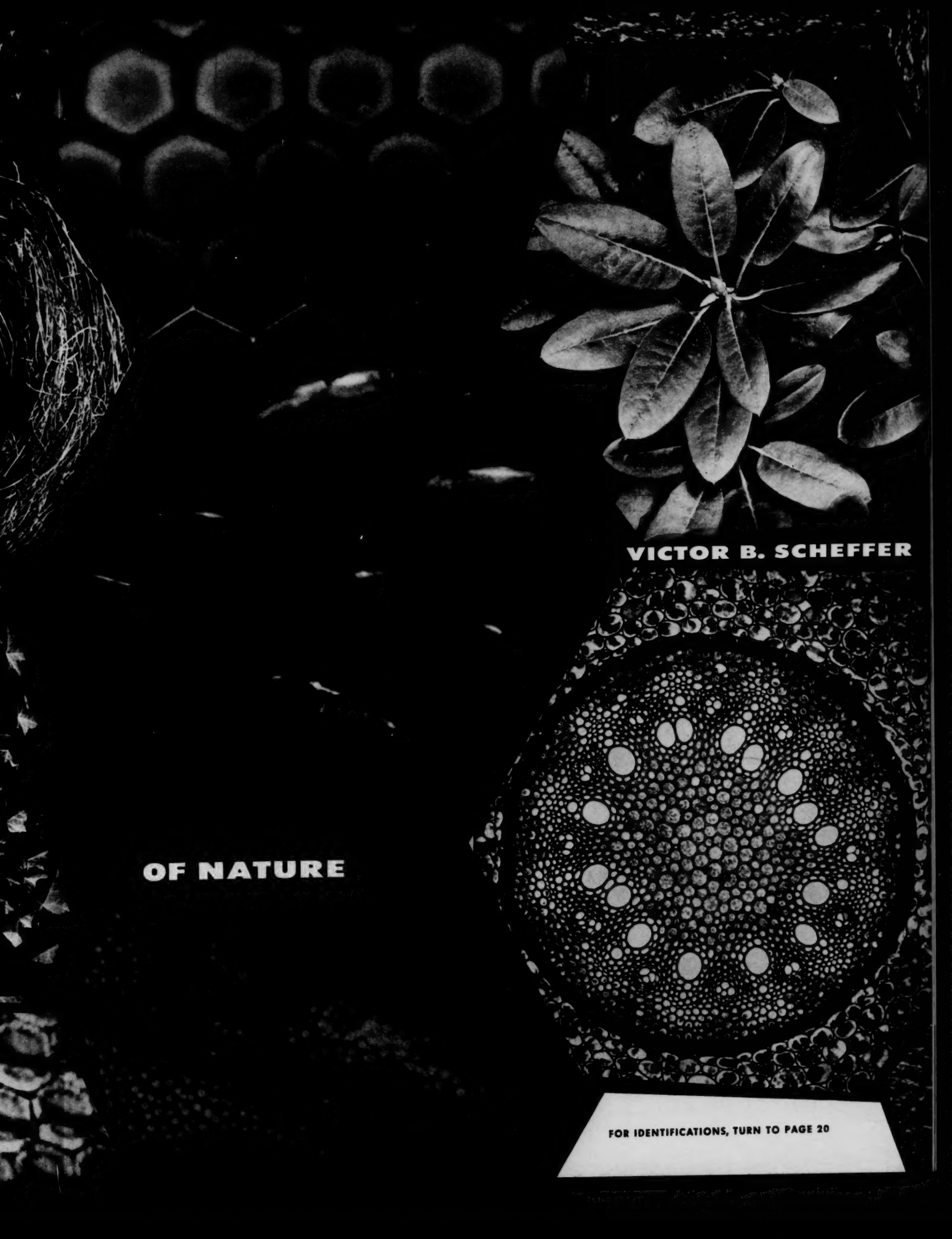
Watching Ichihara at work, we could see he was no armchair observer. Whales in, he was right on deck, dissecting organs, taking measurements, writing notes. In spare hours he usually preserved specimens and kept his records in order. Earlier in the season he had gone with catcher ships to mark whales with a gun which shot metal tubes into their blubber. Recovered years later on factory ships, the tubes supply valuable data on migration and distribution of whale herds.

"There are around 200,000 finbacks left in the world," Ichihara estimated. "And the number is going down. But a lot is being done to prevent their extermination." If the numbers ever become dangerously low, the International Whaling Commission could prohibit or limit capture until counts show a satisfactory increase. The hunting of blues is severely restricted now; that of humpbacks was several years ago. Whaling companies are naturally concerned about keeping up the numbers of whales. That is why the Taiyo Company is a sponsor of Ichihara's organization, the Whales Research Institute.

In the research work of such men as our friend Ichihara and in the constant surveillance of the whaling commission lies the hope that whales will be roaming the oceans for many years to come and will not become extinct in the foreseeable future.




SPATIAL PATTERNS
IN THE WORLD



OF NATURE

VICTOR B. SCHEFFER

FOR IDENTIFICATIONS, TURN TO PAGE 20

SPATIAL PATTERNS IN THE WORLD OF NATURE

WE OUGHT to "increase our understanding of the world around us by linking visual with intellectual understanding," Alan Jarvis has said. And Lewis Mumford has added: "good photography . . . is one of the best educations toward a rounded sense of reality."

Stimulated by such remarks, we have collected a few photographs which seem to link beauty and meaning in nature—which hold a message for both the artist and the scientist. These pictures show geometric or checkerboard spacing in rocks, plants, and animals. This kind of spacing is extremely common. It results, quite simply, from one force trying to hold a cluster of like objects together on a horizontal plane and another one trying to push them apart. The end is a balance, or equilibrium, which may represent a rhythmic pattern of great beauty.

Among living plants and animals, the interplay of opposing forces is, at times, active competition expressing itself in territorial behavior. For example, albatrosses, murres, gannets, penguins, flamingos, and many other water birds display a remarkable pattern of distribution on their breeding grounds, where each bird tends to remain at a "peck distance" from its neighbor. James Fisher has estimated at 165,600 the total population of the gannet *Morus bassanus* which breeds entirely within the North Atlantic Ocean area. On the gannetries, each pair of birds occupies about one square meter of ground. Territoriality—the "keep-your-distance" idea—has been regarded by some zoölogists as an evolutionary development in the direction of population control through imposition of reduced chances of mating.

Even in flight through the air, social or flocking birds tend to maintain a spatial pattern. Keeping one's distance while at the same time remaining in communication with the group is obviously an advantage to birds in migration, or in search of food. Spaced too tightly, one bird may collide with another; too far apart, the stray bird may lose its way, or lose its chance to share in a communal find of food.

Traveling by airplane over the rangelands of the West, I have often looked for rhythmic patterns on the brown earth beneath. Several times I have returned by auto to study more closely some formation whose nature and origin were mysteries from 15,000 feet in the air. On the plains of Colorado and Wyoming, light-colored mounds of the harvester ant may compose a pattern almost as regular as that of checkers on a board. An ant colony lives in each mound; its members go abroad in good weather to forage for seeds. We may think of the mound as being in the center of a territory whose borders mark the effective foraging limits of the colony. Though invisible, these borders are ideally arranged in a pattern of regular hexagons.

For twenty years I have been interested in landscape patterns known as "pimpled plains," widely scattered on grasslands of western North America from northern Mexico to southern Canada. Their origin has been laid to various sources, some inorganic (such as frost action) and some organic (such as burrowing animals). It seems increasingly clear, however, that they are primarily the work of burrowing rodents. The mounds represent territoriality pushed to the visible surface by an underlying soil formation which is unattractive, or impervious, to rodents. The largest and most spectacular pimple mounds lie within the range of the pocket gopher and are seven feet high.

Along the seashore, groups of invertebrate animals living in tight formation on a flat rock display an intriguing pattern. Mussels, for example, grow side by side in passive competition for space, and when one dies its place is soon taken by the free-swimming larva of another. Here the biological advantages of commu-

← Columnar lava (Tertiary), Clam Shell Cove, Staffa, Argyll, Scotland. (Photo from British Geological Survey and Museum)

→ Pimple mounds on Mima Prairie, Thurston County, Washington, November 1950. (Arthur M. Ritchie)

nity life are physical protection (shelter) and increased chances for cross-fertilization.

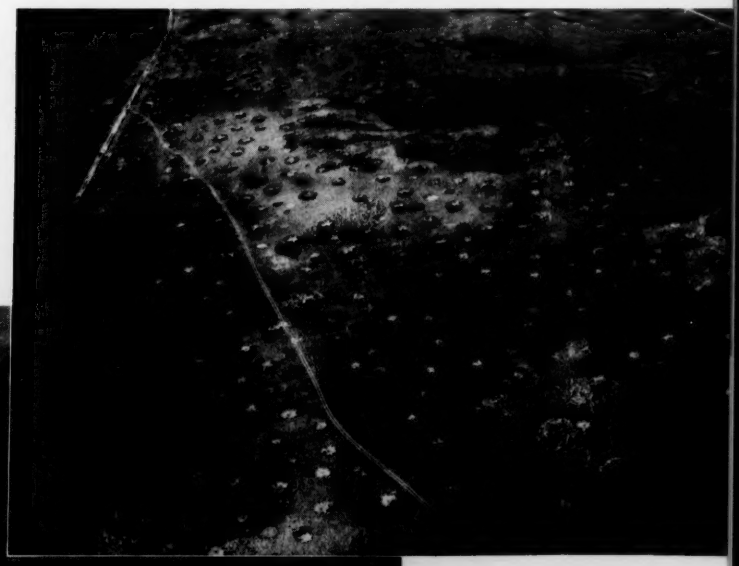
The spacing of leaves on a flowering plant or shrub is a phenomenon so ordinary that we tend to overlook it. Yet in its struggle for a living share of sunlight each leaf may contribute to an arrangement which, more than rhythmic, is positively symphonic. These arrangements can seldom be appreciated from the seat of an automobile traveling at thirty miles an hour through the park. They are, rather, to be studied and enjoyed from a position on one's knees in a corner of the garden. We suppose that, in its evolutionary history, the characteristic leaf pattern of each kind of plant has now become well fixed. Nevertheless, if we pluck one leaf from a plant we see that neighboring leaves soon bend or grow out to take its place. The plant organ, like the animal organism, is able to adjust to new conditions and to compete actively for space.

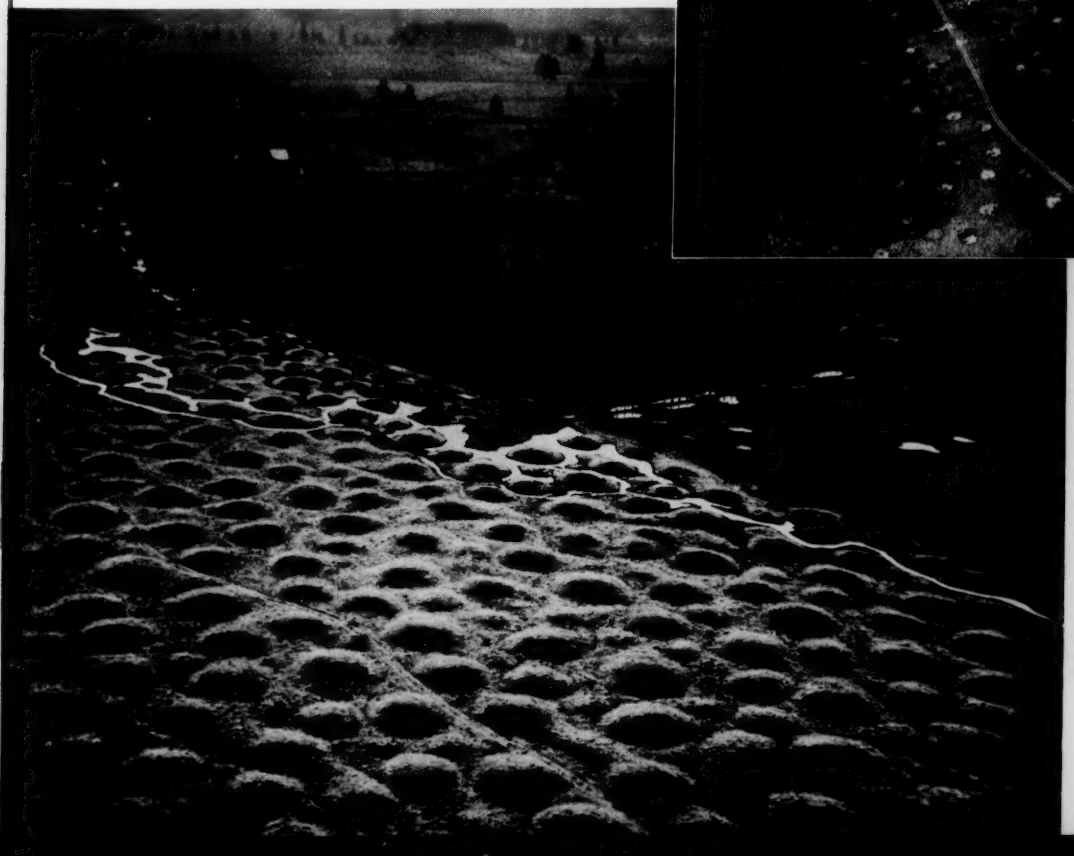
On a larger scale, the patterns displayed by plant associations—by communities of whole plants—may give to the landscape a pleasing texture. Air travelers above the swamps and tundras of Alaska can see hummock or tussock formation by the square and monotonous mile. Each hummock is seldom more than a foot or two in height, and is composed mainly of plant roots, both dead and alive. How do these patterns arise? We can only guess that hummock spacing is the result of forces operating in all directions along a horizontal surface. According to Dr. G. Dallas Hanna* these forces probably include freezing and thawing, as well as the bunching tendency of certain grasses. They probably do not include the action of wind or running water, since both are directional, writing their messages as linear, oriented ridges and troughs.

Again, not rhythmic but symphonic may be called the patterns in plant roots and stems as seen under the microscope. Here slender tubes, some large and some small, each with its own shape and function, are arranged in parallel bundles. Because the whole root or stem is usually circular in cross section, the spacing of the bundles is either concentric or radial. The tubes exert but little pressure against each other during the process of growth, and the individual tube tends to remain a firm-walled, cylindrical vessel, appropriate for the dual tasks of carrying sap and giving strength to the root or stem.

In drying mud or cooling lava, the gooey matrix is continually shrinking. It eventually forms, or tends to form, vertical columns, side by side, each hexagonal

* Curator of Geology, California Academy of Sciences.





↑ Mounds built by red harvester ants near Manderson, Wyoming, August 1951. (Burton W. Silcock)

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in cross section. The beautiful simplicity of line—the mathematical economy—of the hexagon is also displayed in the compound eye of the dragonfly and in a honeycomb. The six-sided figure is the unique form in nature which, in an overall pattern of equal, regular, adjacent polygons nearest approaches a circle. The circle represents the goal, as it were, of the unit, whether organic or inorganic, attempting to expand radially; the hexagon represents the compromise shape into which it is forced by its neighbors. Thus the "territoriality" of the lava column is related mathematically to the "territoriality" of the ant colony on a Western plain.

Spatial pattern in the outdoor world is only one of many sources—including color, contrast, line, and texture—from which the artist throughout history has drawn inspiration for his work. Now, as he advances through impressionism to pure abstraction he seems to be leaving nature farther and farther behind. While most of us applaud the direction of his move, we remind ourselves from time to time of the mother-source of art: the "touch of nature that makes the whole world kin."

Identification of "Spatial Patterns," pages 16–17, is by vertical rows beginning with the left side of page 16, and going from top to bottom in each row:

1. Columnar basalt showing hexagonal fracture, Devil Postpile National Monument, California. (National Park Service photograph)

2. Nesting gannets, *Morus bassanus*, on a gannetry in northern British Isles, mid-July. (Eric Hosking)

3. Mussels, *Mytilus californianus*, Tatoosh Island, Washington, mid-July. (Author: from a 35 mm. transparency)

4. Glaucous-winged gulls, *Larus glaucescens*, in flight over Bering Sea near Pribilof Islands, as seen from above, mid-July. (Author & Karl W. Kenyon, aerial photo)

5. Nest of rosy finch, *Leucosticte tephrocotis*, in deserted building, St. Paul Island, Alaska, late July. (Author, from a 35 mm. transparency)

6. English ivy, Seattle, late September. (Author)

7. Hexagonal lenses in compound eye of dragonfly, greatly magnified. (Author)

8. Honeycomb, enlarged. (Author)

9. Part of school of oceanic skipjack, a tuna, from an underwater "blister" on the FWS Bureau of Commercial Fisheries research vessel *Charles H. Gilbert*, 10–12 miles south of Barber's Point, Oahu, Hawaii, 13 July 1959. Length of fish ranges from 19 to 27 inches, average 22 inches; weight 5 to 15 pounds. (Official photo: U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Biological Laboratory, Honolulu. See also cover)

10. Pimple mounds in Albany County, Wyoming, land elevation 7,500 feet, mid-June; intermound hollows darkened by a recent flow of water. (U.S. Geological Survey; aerial photo)

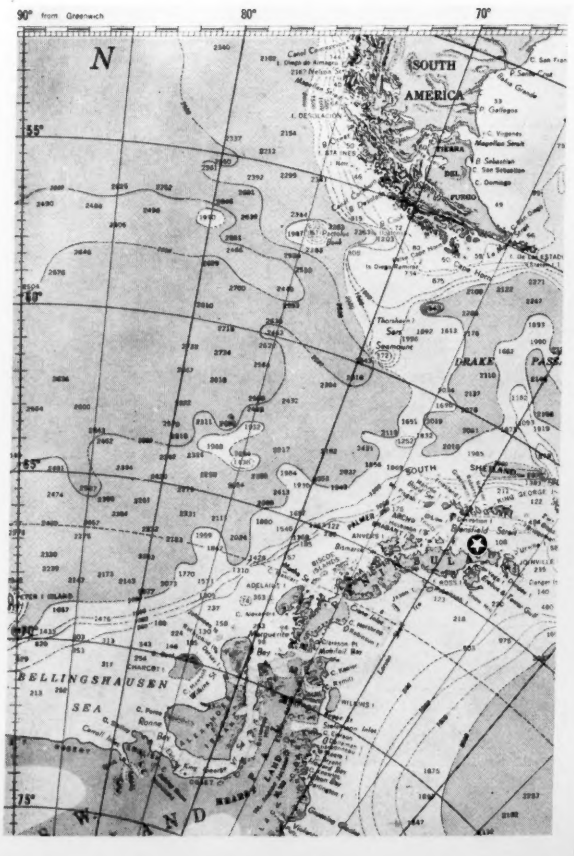
11. *Rhododendron croceum*, University of Washington Arboretum, Seattle, late September. (Author)

12. *Smilax* root, cross section. (Author)

Small areas at edges are tundra near Zapadni, St. George I., Alaska, mid-July, from 1,200 feet above. (Author & Karl W. Kenyon, aerial photo)

A Vignette of History by

JOSEPH L. PARKHURST, Jr.



CAPTAIN PALMER'S CONTINENT

WHEN THE SEAL ROOKERIES around the tip of South America had been cleaned out, sea captains of the nineteenth century turned south, probing deeper into Antarctic seas for their cargoes. Following reports of a group of islands discovered some distance beyond Cape Horn, seal-skin hunters converged on the new grounds. The 1833 edition of *Fanning's Voyages* includes a brief account of an American expedition to the South Shetlands during the 1820–1821 season, with a particularly interesting bit of news.

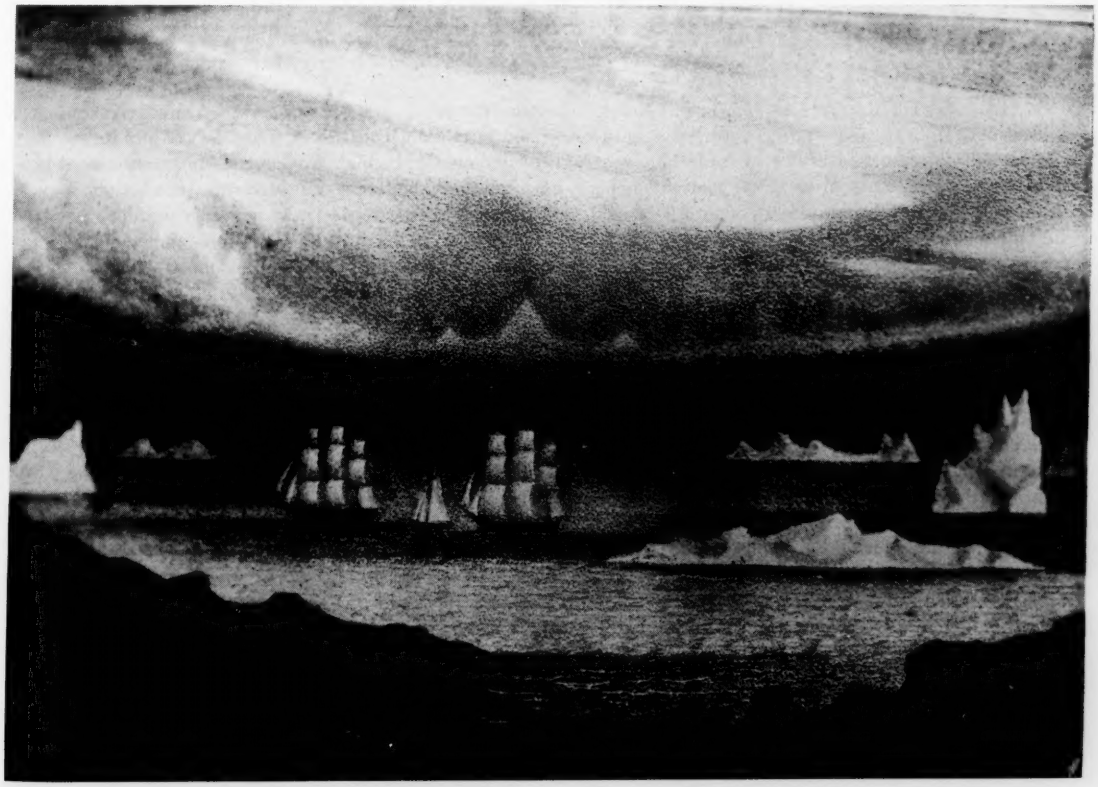
In November 1820 a fleet of five ships from Stonington, Connecticut, anchored at Yankee Harbor in the South Shetland group. Fanning records a range of peaks seen by the squadron commander, Captain Benjamin Pendleton, while scanning the southern horizon from Deception Island. "To examine this newly discovered land, Captain N. B. Palmer, in the sloop *Hero*, a vessel but little rising forty tons, was dispatched; he found it to be an extensive mountainous country, more sterile and dismal if possible, and more heavily loaded with ice and snow, than the South Shetlands; there were sea leopards on its shore, but no fur seals; the main part of its coast was ice bound, although it was in the midsummer of this hemisphere, and a landing consequently difficult."

Returning from this excursion the *Hero* was caught in a thick fog, then suddenly emerged and found herself between two warships displaying the Russian colors. Moments later Captain Palmer was invited aboard and learned that the ships had been exploring the same area, on an assignment from Czar Alexander I taking them around the world. The Russian commodore remains nameless in Fanning's journal, but there is little doubt that he was Captain Fabian Gottlieb von Bellingshausen, one of the many Germans to serve czar and commissar.

Before seeing the American ship off the South Shetlands the Russians thought they had made a discovery, and were even more surprised to hear about the existence of a vast southern continent. "Captain Palmer while on board the frigate, was entertained in the most friendly manner, and the commodore was so forcibly struck with the circumstances of the case, that he named the coast then to the south, Palmer's Land; by this name it is recorded on the recent Russian and English charts and maps which have been published since the return of these ships."

At this point there is a footnote telling the reader that Fanning's story of this discovery was obtained from Benjamin Morrell, a Stonington shipbuilder who went to the Antarctic in 1823. The position of the *Hero* and the larger Russian ships after the fog had lifted is shown clearly in a picture attached to this account. "In their immediate neighborhood were many ice islands, some of greater and some of less dimensions, while far off to the south, the icy tops of some two or three of the mountains on Palmer's Land could be faintly seen; the wind at the time was moderate, and both the ships and the little sloop were moving along under full sail."

The next year, when the Stonington fleet paid another visit to the South Shetlands, Palmer drifted along the coast of his "new continent." Although he had only the sketchiest idea of the size and shape of Palmer's Land, further investigation proved that he found the outermost point of Antarctica.



The portrait of Nathaniel Brown Palmer (1799–1877) is from an engraving in the files of the Marine Historical Association, Mystic, Conn. The somewhat romanticized view of the *Hero* between two Russian ships appeared in *Fanning's Voyages* (1833). Our chart is a section of U.S. Navy H.O. 2562 (1943 ed.).

COCHINEAL RED

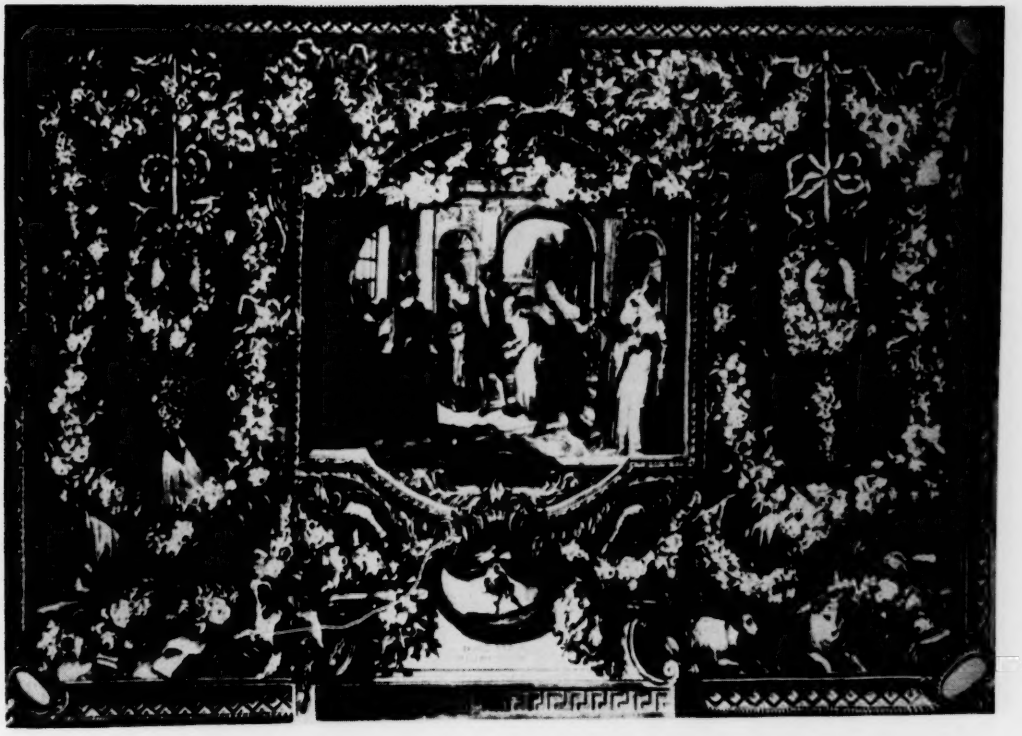
A SMALL UGLY GRAYISH INSECT that hides itself beneath a ragged white covering was until a century ago an important article of trade between nations. During the course of its 2,500-year commercial career, it enriched the world with beautiful colors, made millionaires, and created severe local economic depressions. The cochineal scale insect is a parasite which infests the nopal cactus and produces a deep carmine dye.

Probably the first historic reference to it was made by the Spaniards after the conquest of Mexico. Cortés cautioned one of his followers, Bernal Díaz del Castillo, who later wrote a history of the expedition *(The Discovery and Conquest of Mexico 1517–1521)* to be sure to include cochineal in his records. The Spanish conquistadors were truly amazed by both the variety of goods and the quantity of people who patronized the Aztec markets. More than 60,000 people traded daily in Tenochtitlán's fabulous marketplace which sprawled over acres of the canaled capital city.

As explained to the curious Spanish explorers, the Aztecs had used cochineal mixed with animal grease for body paint and cosmetic purposes, for medicine and for dyeing textiles a luxuriant red. Moreover, they prized it as a chief article of trade. It was produced in abundance in the high, dry central Mexican plateau and they exchanged it for brilliantly colored bird feathers from the tropical regions. This dull-looking insect had a lot to do with the gorgeous, exotically feathered plumage of Montezuma's court.

One of the first exports of the Western Hemisphere to the Old World was this tiny cochineal. The Spaniards came in search of yellow gold. But they were astute enough to sense the economic value of this natural red dye. In 1523, only five years after they invaded Mexico, they shipped these live insects by sailing vessel to Spain, Algeria, and the Canary Islands. Because of the similar climate of these lands, the industry took instant hold. In fact, it took over the market for the hitherto exclusive red dye produced around the Mediterranean since the time of Moses by the red gall-like bodies of the female scale insect, *Kermes ilicis*. These insects lived on oak trees in southern Europe, Asia Minor, and North Africa. The color of cochineal was more brilliant and its dyeing qualities were so superior to *Kermes* that one

Cochineal harvest time in Algiers. The prickly-pear cactus was, of course, introduced from America. (Woodcut after Blanchard, *Ciba Review* photo)



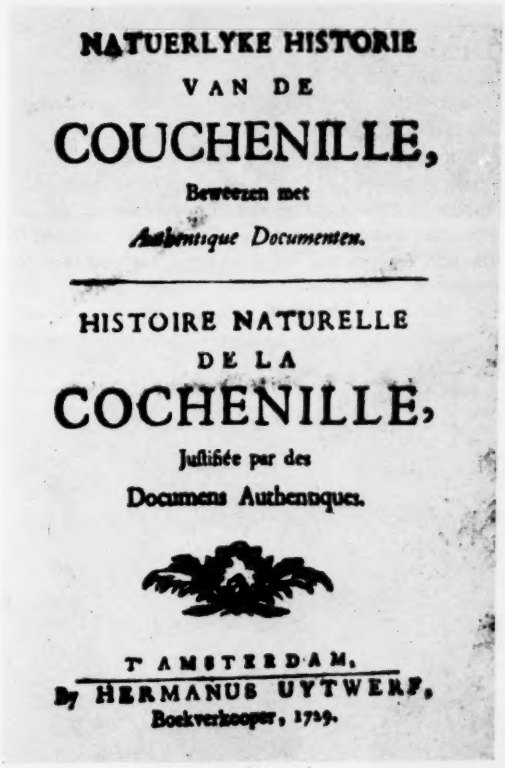
Hiram L. & Annette R. Parent

pound of the former produced the same effect as ten pounds of the latter.

Kermes beat a hasty retreat and cochineal was king.

So successful was the import that the Canary Islands' economy boomed. The price of terraced lands skyrocketed when Mexican cactus was imported and artificially cultivated as host for cochineal. Some of the land could not be bought for less than $15,000 to $20,000 an acre. And this was not the inflationary World War II era! At $1.50 per pound the dried insect created incredible fortunes for affluent absentee landlords.

Production reached its peak in 1876 when 7,000,000 pounds were exported. Then, as aniline dyes— later to be derived from coal tar— were discovered by a German in breaking down indigo in 1826, the future of cochineal was sealed. When the first commercial aniline dyes appeared in 1856, demand for them mushroomed. The synthetic product was considerably cheaper than the natural one. In twenty years, cochineal went into a severe slump. For 350 years, it had enjoyed unchallenged superiority in Europe. But, like the *Kermes* which it replaced, it, too, was doomed


NATUERLYKE HISTORIE
VAN DE
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HISTOIRE NATURELLE
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Justifiée par des
Documens Authentiques.

T' AMSTERDAM,
By HERMANUS UYTWERF,
Boekverkooper, 1729.

↑ Gobelin tapestry in the Museum of Fine Arts, Vienna, woven by Jaques Neilson, 1781. The floral background of the border is scarlet from cochineal dye. (*Ciba Review* photo)
→ Title-page of Melchior de Ruuscher's *Natural History of Cochineal*, Amsterdam, 1729. (*Ciba Review* photo)

to be a casualty of progress. And the economic chaos into which it threw those dependent upon the industry for their livelihood, particularly in the Canary Islands, was a sad spectacle.

The scientific name of cochineal is *Dactylopius coccus. Coccus,* Latin form of the Greek *kokkos,* means grain or berry, referring to its appearance. It can live on various species of cactus but the one on which it thrives in Mexico is *Nopalea cochenillifera,* a flat-leafed type of cactus similar to prickly pear. Its name was appropriately derived from the Aztec *Nopalnocheztli,* meaning "blood of the nopal." Francisco Hernandez, the first European botanical explorer to set foot in Mexico, was commissioned by the King of Spain to write a book on the native herbs for medicinal use in Europe. Between 1570 and 1577, he compiled a ponderous tome of Mexico's flora. He found the natives called the plant *Tlatocnochtli,* meaning "cultivated nochtli."

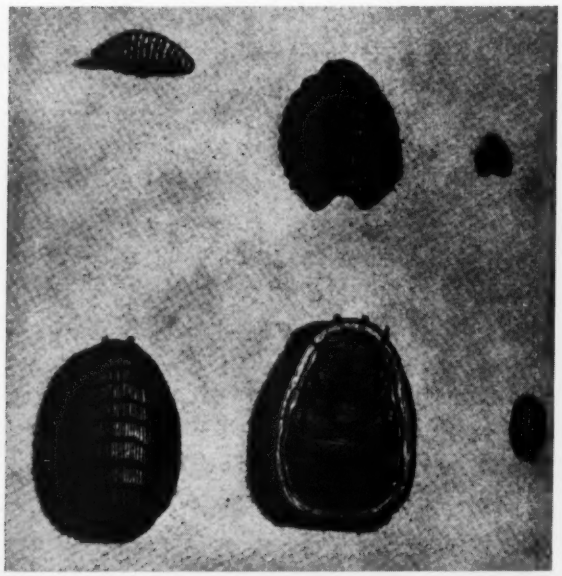
Cochineal and its host are given the care customarily bestowed on silkworms. Some eleven species of insects prey on cochineal. Only the female produces the dye. The males, which number only one to 200, are of significance only for reproduction. The female is about 2 mm. long with somewhat globular wingless shape divided into 9 to 12 segments. When ready to lay her eggs, she becomes distinctly ovoid. She covers herself, probably to escape intense heat, with a white waxy glandular secretion formed by her wax pores and hairs. It is this sticky substance which the casual observer sees.

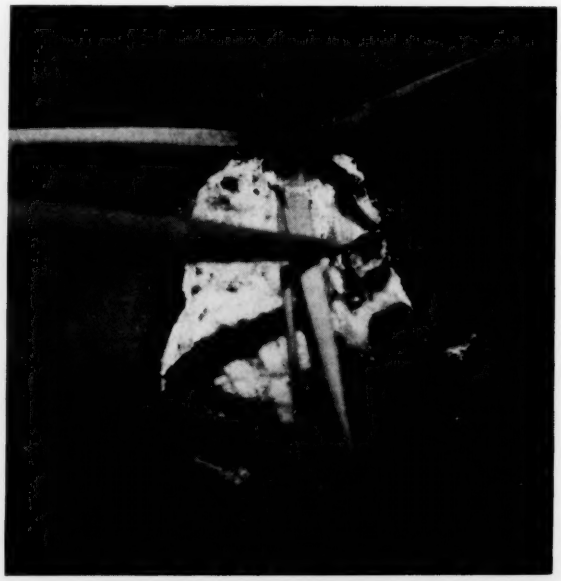
Before the rainy season begins, branches of nopal are cut and protected under shelter. At the close of the wet months, about the middle of October, little nests made of soft woody fiber, each containing eight to ten females from the pampered supplies, are suspended upon the spines of the nopal. The insects, warmed by the sun, emerge and lay their eggs, each female producing more than a thousand young. These latter spread rapidly over the flat green leaves in search of nourishment. As the young females become impregnated, they attach themselves to the leaves, sucking its contents, and swell to almost double their original size. They look more like vegetable excrescences than animated creatures. And this is the time when they attain their commercial value. For now these fat females are harvested.

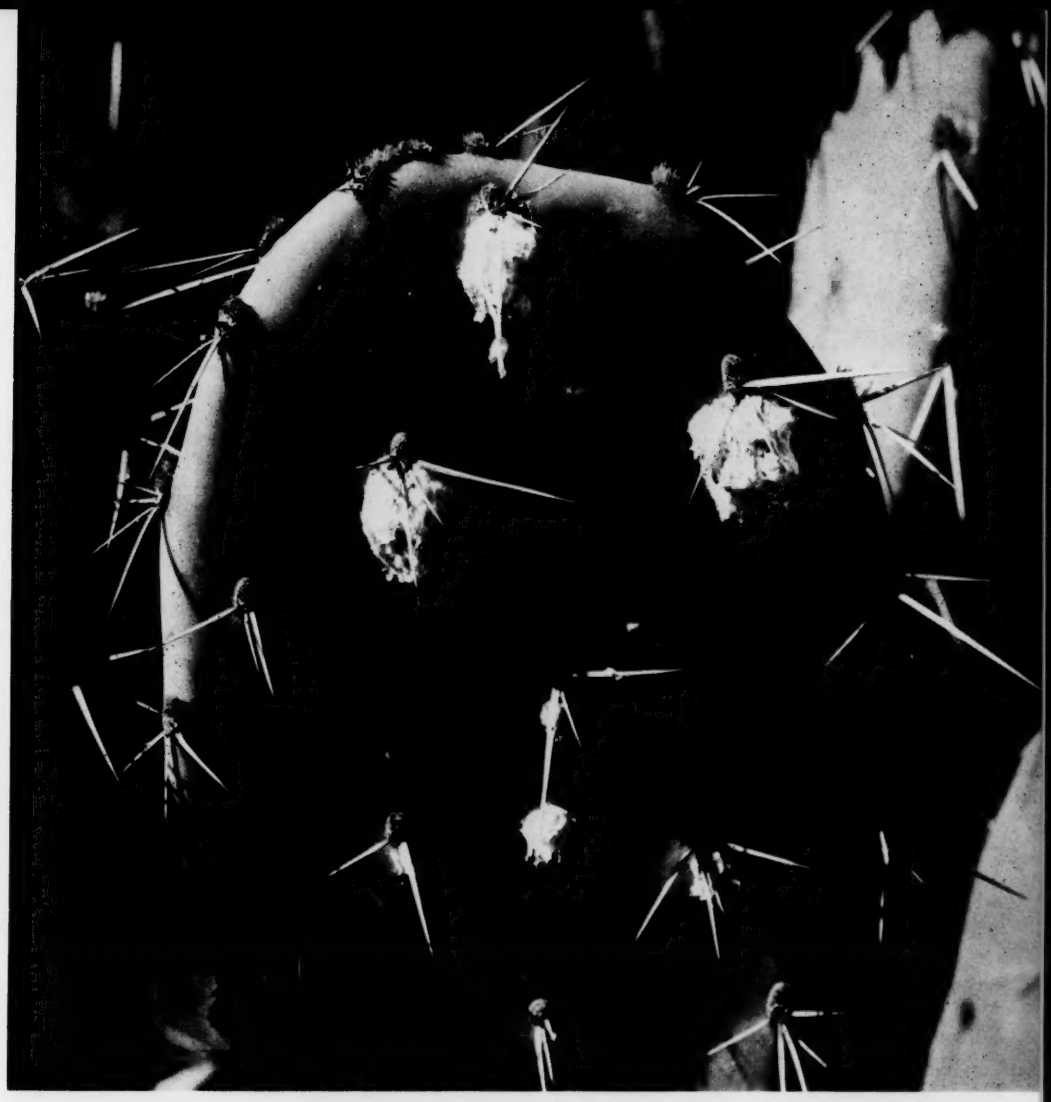
They are picked off with a blunt knife and dropped into bags by laborers who pick enough in one day to make two ounces of dried cochineal. Since about 70,000 insects are required to weigh a pound, as much efficiency as possible is necessary to make the industry profitable. Only countries where hand labor is still common and an industrial civilization has not yet taken hold can afford such a venture. Three or more crops are harvested in a single season, which ends in the late spring.

The live insects are treated in steam or hot water in large vats or are oven or sun dried. The particular process employed determines the quality – which varies considerably–of the commercial article. The most valuable kind, known as *madres,* is made from the first brood of the season. At one time, Honduras shipped the best commercial product. The highest quality today comes from Tenerife, one of the Canary Islands.

There are three main grades–silver grain, black grain, and granilla–with a dozen intermediate qualities. Silver grain is prepared by drying the insects in trays in the sun or in an oven at a moderate temperature of about 149° F. for four or five hours followed by an interval in the sun. The waxy substance is not melted and the color is white with a silvery sheen. The black grain results when they are dried on hot plates at a temperature higher than the 222° F. wax melting point. The black grain usually commands the







→ The white waxy secretions of the cochineal insect are usually attached to the spine clusters. of the nopal cactus.

← (LEFT) Illustrations of the cochineal scale insect, an early attempt to show the zoological details. The engraving appeared in Réaumur's *Mémoires pour servir à l'histoire des insectes*, Paris, 1738. (*Ciba Review* photo) (RIGHT) The toothpick points to one of two wild cochineal insects. Ordinarily they would be hidden under the white secretion. (Hiram L. Parent)

higher price. Many ways are known to adulterate the grain by using magnetic iron sand, carbonate of lead, sulfate of barium, and powdered talc.

The Aztecs used urine as a mordant for vegetable dyes. A mordant is a substance which by combining with a dyestuff to make an insoluble compound, produces a fixed color which will not fade or wash out in textiles, leather, etc. The carminic acid $C_{22}H_{20}O_{13}$ of cochineal lent itself to considerable experimentation. In 1650, a Dutchman, Cornelius van Drebbel, discovered how to produce a new brilliant scarlet on wool by using a combination of tin and cochineal. Later, it was found that when applied to wool, chromium or iron and cochineal would give purple, aluminum and cochineal would give crimson, and copper and cochineal would give claret. Cochineal left an indelible mark on European and American culture with its brilliant hues on satins, brocades, velvets, silks, and wools from the Renaissance to the modern era when the industrial revolution decreed its decline. And its use extended way back into Aztec and Inca antiquity.

Today, cochineal is produced on a relatively minor scale on plantations in Mexico's Oaxaca, in Peru and other Central and South American countries as well as the Canary Islands, southern Spain and Algeria. But it is only a shadow of its former robust self. Its orginal glory has faded.

Its strong red dye is used in foodstuff coloring, in frostings, pop, ice creams, etc. Pharmaceutical houses purchase it at $2 a pound and scientific laboratories use its distinctive color for microscope slides. It is claimed that in some of the new synthetic fabrics cochineal adheres better than do the chemical aniline dyes. Maybe the pendulum will swing again in favor of this lowly creature. Perhaps all its past prominence has not vanished. Perhaps there remains some future for this prolific insect Cinderella.

FOCUS ON NATURE WITH ARTHUR C. SMITH

BY THE TIME YOU READ THIS your nature editor hopes to be relaxing beneath a pine tree on the shores of Fallen Leaf Lake in the Sierra near Lake Tahoe. If he can summon up enough energy he may make it to the top of Dick's Peak to see if his name is still in the little tin can where he placed it in July 1934 and again in July 1939. The 1939 trip was a memorable one in that at daybreak our party was hiking to the top of Red Lake Peak (just north of Carson Pass) and at sunset of the same day we were coming back down Dick's Peak. In each case we observed the rosy finches and swifts we were seeking and collected a goodly number of very desirable arctic-alpine butterflies as well. Among others the group included ornithologists Arthur A. Allen and his son David of Cornell, bird watcher par excellence Frank Watson of Marin County now watching birds in Texas, and my twin brother, Edgar, now an entomologist with the ICA Malaria Control Program in Indonesia.

In picking photographs of lizards for this issue I also had occasion for much reflecting back to what we so frequently call the "good old days." Many of these pictures were taken at the time when this writer was a student at San Jose State College. Vividly remembered is a week at Palm Springs and Death Valley with the late Gayle Pickwell. Dr. Pickwell chartered a Peerless bus for 30 of us registered in a short course on desert biology. During that week all but a few of the lizard species pictured here were seen, captured, and posed before Gayle Pickwell's camera. Other photographs in the Pickwell file reveal that on earlier expeditions Carl Duncan, now Head, Division of Natural Sciences at San Jose State College, and Emily Smith, retired botanist and naturalist of that institution, were just out of camera range in many of the lizard pictures and were responsible for capturing the Chuckwalla shown on page 27. Other lizard catchers prominent in the Pickwell negative files are Tom Rodgers, now at Chico State College and Elmer Aldrich, now Chief, Division of Recreation, California Department of Natural Resources.

Reports from my students at Alameda County State College this spring (most of whom teach in the elementary schools of Alameda and Contra Costa counties), indicate that the three phases of nature which arouse the greatest interest among the largest number of grammar school children are insects (especially butterflies), lizards, and rocks and minerals in that order.

If our pictures have aroused your interest you may wish to know where you can obtain more information about lizards. The following publications are useful:

Amphibians and Reptiles of the Pacific States. By Gayle Pickwell. Stanford University Press, Stanford. 1947.

Amphibians and Reptiles of Western North America. By Robert C. Stebbins. McGraw-Hill, New York. 1954.

Reptiles and Amphibians of the San Francisco Bay Region. By Robert C. Stebbins. University of California Press, Berkeley. 1959.

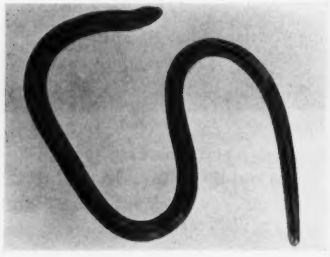
The Reptiles of Western North America. By John Van Denburgh. California Academy of Sciences, San Francisco. 1922.

For help in caring for living lizards, consult:

The Book of Wild Pets. By Clifford Moore. Branford, Boston. 1954.

How to Make a Miniature Zoo. By Vinson Brown. Little, Brown and Company, Boston. 1956.

For names and habits of these 19 western lizards, turn to page 28



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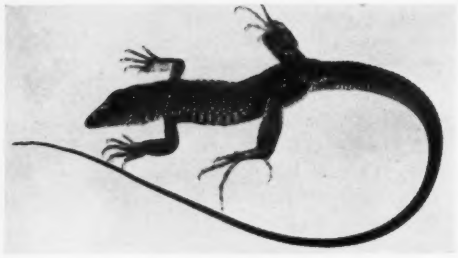

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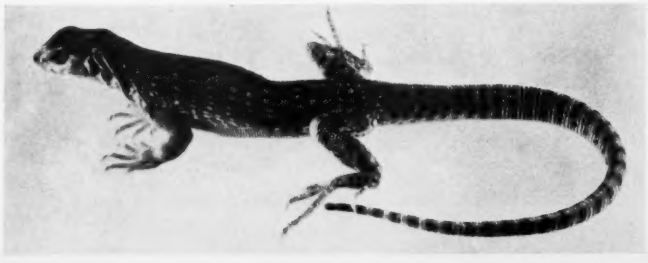

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What Do You Know About- LIZARDS?

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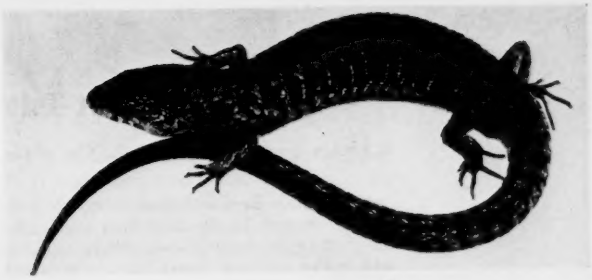

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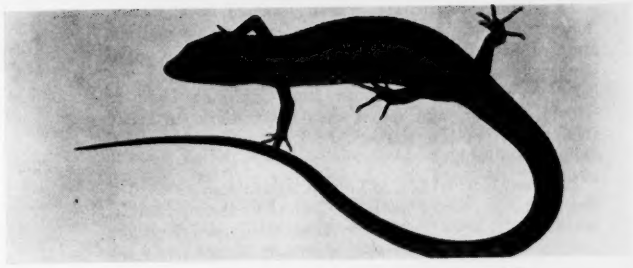

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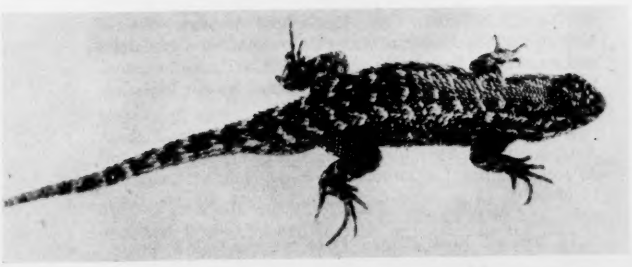

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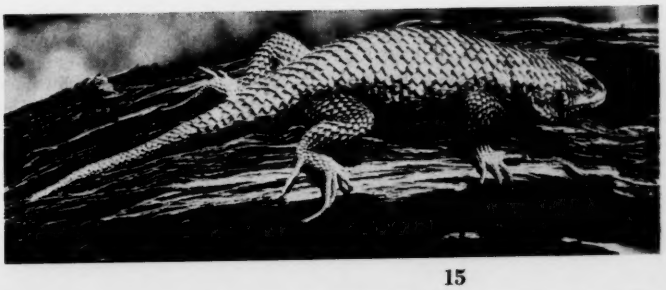

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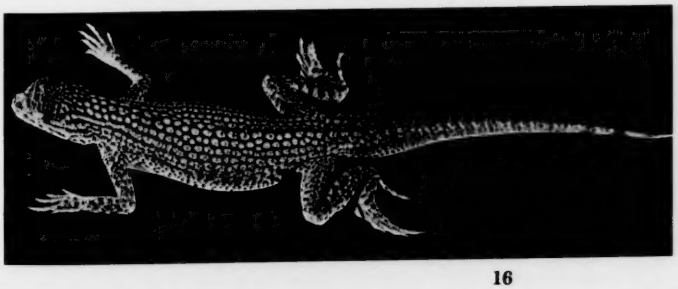

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A Look at Lizards

in photos (pages 26–27) from the files of Gayle Pickwell

1. California Legless Lizard (*Anniella pulchra*), 4½–6¼ inches.* *Range*: locally from Baja California north along the coast to the Antioch sand hills (Contra Costa County) and in the southern Sierra Nevada Mountains. *Habitat*: sand dunes and areas of humus or leaf litter. *Food*: insects and spiders.

2. Zebra-tailed Lizard (*Callisaurus draconoides*), 2½–3½ inches. *Range*: southeastern California, central and southern Nevada, central, southern and western Arizona, southwestern Utah, and parts of Baja California and Sonora. *Habitat*: sandy and gravelly desert flats. *Food*: insects, spiders, and other arthropods.

3. Western Whiptail (*Cnemidophorus tigris*), 2⅞–4 inches. *Range*: widely distributed throughout the West, south from Oregon and Idaho into Baja California and east to Texas and Mexico below the Rio Grande. *Habitat*: creosote desert areas, sage brush plains, and bushy foothills. *Food*: insects and other arthropods.

4. Banded Gecko (*Coleonyx variegatus*), 2½–3 inches. *Range*: southern California and Nevada, southwestern tip of Utah, northwestern, western, and southern Arizona, into Baja California and Sonora. *Habitat*: sandy flats and washes; under yucca trunks, stones, boards, and debris. *Food*: small insects and other arthropods.

5. Collared Lizard (*Crotaphytus collaris*), 3¼–4½ inches. *Range*: eastern California, north to Oregon and Idaho, east through Kansas, Oklahoma, and Texas almost to the Mississippi; south into Mexico. *Habitat*: usually rocky, mountainous or hilly areas in arid or semiarid regions; sometimes sandy areas. *Food*: other lizards, small snakes, and large insects.

6. Desert Iguana (*Dipsosaurus dorsalis*), 4–5¼ inches. *Range*: southeastern California, southwestern Arizona, southern tip of Nevada, southwestern corner of Utah, and into Baja California and Sonora. *Habitat*: usually low sandy plains not far from creosote bushes; sometimes in rocky regions or areas of clay soil. *Food*: mostly buds, flowers, and leaves of desert plants; some insects.

7. Leopard Lizard (*Crotaphytus wislizeni*), 3½–4½ inches. *Range*: eastern California (also San Joaquin Valley) north to Oregon and Idaho, south into Baja California; east to Texas, New Mexico, and western Colorado. *Habitat*: brushy desert, foothill grasslands, and sagebrush plains. *Food*: seeds and blossoms as well as insects and lizards.

8. Western Skink (*Eumeces skiltonianus*), 2½–3¼ inches. *Range*: most of Idaho, Oregon, and Washington; southern edge of British Columbia; western portion of Montana and Utah; northern 2/3 of Nevada; northern part of California and along the coast into Baja California. *Habitat*: in or under decaying logs, beneath stones, bark, or ground litter in woodlands and grasslands. *Food*: insects and other arthropods.

9. Northern Alligator Lizard (*Gerrhonotus coeruleus*), 3½–5¼ inches. *Range*: northern California (except the Central Valley), western Oregon and Washington, southern British Columbia, and portions of Idaho and Montana. *Habitat*: beneath logs, stones, and other similar objects usually in or near coniferous forests. *Food*: insects, spiders, millipedes, and snails.

10. Southern Alligator Lizard (*Gerrhonotus multicarinatus*), 4–6½ inches. *Range*: a narrow zone starting in Washington just north of The Dalles through Oregon in line with the Willamette Valley; including most of California except the northeast corner, the High Sierra (except for an isolated colony), and the desert areas; also found in Baja California. *Habitat*: under rocks and logs and in deep thickets in woodland, grassland, and chaparral areas. *Food*: insects, spiders, snails, and the eggs and young of birds.

11. Gila Monster (*Heloderma suspectum*), 12–16 inches. *Range*: primarily southern and western Arizona and the State of Sonora in Mexico; also southwestern corner of Utah, southeastern tip of Nevada, and southwestern corner of New Mexico; not known from California. *Habitat*: arroyos, washes, and desert flats; particularly in rocky areas. *Food*: nestling birds, bird and reptile eggs, small rodents and rabbits.

12. Coast Horned Lizard (*Phrynosoma coronatum*), 3–4 inches. *Range*: Sierra foothills, Central Valley, and southern Coast Ranges south into Baja California. *Habitat*: areas of sandy or loose soil in grassland, woodland, chaparral, or coniferous forest. *Food*: insects.

13. Chuckwalla (*Sauromalus obesus*), 5½–8 inches. *Range*: southeastern California, western and southwestern Arizona, southern tip of Nevada, southwestern corner of Utah, into Baja California and Sonora. *Habitat*: rocky hillsides and canyons. *Food*: flowers, fruits, buds, and leaves of many desert plants.

14. Western Fence Lizard (*Sceloporus occidentalis*), 2¼–3½ inches. *Range*: Puget Sound to Baja California, east to Idaho and Utah; from sea level to over 9,000 feet. *Habitat*: widely varied; frequently wooded, rocky areas; also around old buildings, woodpiles, and fences. *Food*: insects and other arthropods.

15. Desert Spiny Lizard (*Sceloporus magister*), 3½–5½ inches. *Range*: southeastern California, western and southern Nevada, southern Utah, throughout Arizona, western New Mexico, far western Texas, and into Mexico. *Habitat*: rocky canyons; frequently about desert trees, bushes, and fallen logs. *Food*: insects; at times small lizards and also vegetation.

16. Fringe-toed Lizard (*Uma notata*), 3–4½ inches. *Range*: southeastern California; southwestern corner of Arizona into Baja California and Sonora. *Habitat*: restricted to areas of loose, wind-blown sand. *Food*: insects, blossoms, and small lizards.

17. Banded Rock Lizard (*Uta mearnsi*), 3–4 inches. *Range*: Coachella Valley south into Baja California. *Habitat*: rocky canyons. *Food*: insects, spiders, and desert plants.

18. Side-blotched Lizard (*Uta stansburiana*), 1¾–2½ inches. *Range*: eastern Oregon and Washington, southern Idaho; throughout Nevada, Utah, and Arizona; small portions of Wyoming and Colorado; New Mexico, except for the northeastern corner, and West Texas; California east of the Sierra and from San Francisco Bay south into Mexico. *Habitat*: open areas in sandy, gravelly, or rocky places from below sea level to 7,000 feet. *Food*: insects, spiders, and other arthropods.

19. Desert Night Lizard (*Xantusia vigilis*), 1½–1¾ inches. *Range*: southeastern California, southern tip of Nevada, southwestern corner of Utah, northwestern corner of Arizona, and into Baja California. *Habitat*: usually in association with Joshua Trees and other yuccas; on trees, under fallen logs, or nearby debris. *Food*: termites, ants, and other insects.

* All measurements of length are given as snout to vent; this does not include the tail which is quite long in some cases.

EARTH SHADOWS and MOON MEN

SINCE THERE WILL ONE DAY be men on the moon, they may very well be called *moon men*. The *moon men* of the future will have a number of experiences impossible for an earth man. The *moon man* will be able to leap easily to a height of twelve or fifteen feet. He will be able to pick up a five hundred-pound bale as easily as he handles a sack of grain on the earth. He will be able to shade his eyes from the sun and see stars shining in the daytime sky.

Probably the most remarkable of the astronomical events which the *moon man* will experience is an eclipse of the moon. This involves the shadow of the earth falling upon the moon, but as seen from the moon it will appear that the sun simply passes behind the earth. While a similar phenomenon on the earth is observed during an eclipse of the sun, the event is not nearly so spectacular nor of as long duration as the comparable event on the moon. The moon appears the same size as the sun or slightly larger when the *earth man* sees a solar eclipse, and the sun can remain hidden for no more than seven minutes at the longest. The *moon man* will see the earth nearly four times the size of the sun and the sun can remain behind the earth for as long as 1.75 hours.

When the sun has just disappeared behind the earth, a beautiful display of light will be seen around the earth. The sun's corona will become visible against the black sky—a pale crown of light extending in faint overlapping streamers to a distance of two or three sun diameters in all directions. A still paler light will be seen in the form of a pair of tapering lobes extending for thirty degrees or more from the sun along the ecliptic. This is the *zodiacal light*. But the most dazzling of all will be the glow of the earth's atmosphere. It will appear as a brilliant ring of light surrounding the earth, brightest at the point where the sun disappeared, and shining with the red and golden colors of an earthly sunset. As the eclipse progresses, the halo of the lighted atmosphere will first become uniform around the earth, but when the sun nears emergence from the intervening earth, the side of its emergence will become more brightly lighted. The reddened sunlight, produced by the same process as the reddening of the sunset sky, falling upon the lunar landscape will create a frightful scene suggesting the fiery stage of a Wagnerian underworld.

Anticipation of such events in the lives of future space men is an important part of the job of the planetarium. The whole dramatic episode of an eclipse on the moon is being created in the Alexander F. Morrison Planetarium during the summer of 1960. Projection equipment to produce all the elaborate effects becomes quite elaborate itself. The sun must be made to disappear behind the earth. The corona and zodiacal light must appear. The glowing atmosphere must change as the sun progresses behind the earth. And a thin crescent of the earth must be seen before and after the eclipse. Added to this effect must be the reddening of the lunar landscape during the eclipse. All these effects have been made possible through the inventiveness of the technical staff of the planetarium. In the anticipation and production of such events these men are writing history before it happens.

G.W.B.

SKY DIARY

July, August, September 1960

(Pacific DAYLIGHT SAVING Time Used Throughout)

Phases of the Moon

First Quarter	July 1	**8:49 P.M.**
Full Moon	8	**12:37 P.M.**
Last Quarter	15	8:43 A.M.
New Moon	23	11:31 A.M.
First Quarter	31	5:39 A.M.
Full Moon	August 6	**7:41 P.M.**
Last Quarter	13	**10:37 P.M.**
New Moon	22	2:16 A.M.
First Quarter	29	**12:23 P.M.**
Full Moon	September 5	4:19 A.M.
Last Quarter	12	**3:20 P.M.**
New Moon	20	**4:13 P.M.**
First Quarter	27	**6:13 P.M.**

The Planets

Earth: Autumn begins for the northern hemisphere September 22 at 4:00 P.M. when the sun crosses the equator from north to south.

Mercury: Is at greatest western elongation on August 5. For a few mornings at this time it may be seen low in the east before sunrise. On August 30 it will be at superior conjunction and too close to the sun for observation in September.

Venus: Appears low in the western sky after sunset as evening star. On September 20 it will pass 3° north of Spica. The magnitude of Venus during these months is −3.3.

Mars: Rises at midnight at the beginning of this period and a little before midnight toward the end. It is prominent in the eastern sky until sunrise, reaching nearly to the meridian before sunrise at the end of the period. During these months Mars increases rather rapidly in brightness.

Jupiter: In Ophiuchus about at the meridian at sunset. It sets about midnight. Jupiter ceases retrograde motion on August 20 and resumes direct or eastward motion. Its magnitude averages −1.9 during August and September.

Saturn: In Saggitarius, east of Jupiter, it is well up in the southeast at sunset and sets before sunrise in August and by midnight in September. Saturn ceases retrograde motion on September 15 and resumes direct or eastward motion. Saturn is +0.5 magnitude during this period.

Special Events: Lunar and Solar Eclipses in September. On the night of September 4–5 a total lunar eclipse will occur which will be visible in the western half of both North and South America and the Pacific Ocean areas. While not beginning as early in the night as the eclipse of March 12–13 (10:38 P.M.) it may not be obscured in this area by rain clouds as the one in March was. The eclipse will begin at 2:36 A.M. on September 5. Totality will last from 3:38 A.M. until 5:06 A.M. and the eclipse will end at 6:07 A.M.

The second partial eclipse of the sun in 1960 will take place on September 20. This one will be seen throughout most of North America. For the eastern part of the United States the eclipse will still be in progress at sunset but will be completed by sunset in the western part. It will begin on the west coast at 2:09 P.M., mid eclipse will be at 4:00 P.M., and it will end at 5:51 P.M. More than half the disc of the sun will be covered by the moon.

Lunar landscape. (By Planetarium artist David Porrazzo)

Japanalia

A Japanese-U.S. Defense Pact *has just been ratified "at a time," says* Life *magazine in commenting on President Eisenhower's "rebuff," "when U.S.-Japanese relations had never been better"—the year of "the 100th anniversary of the first treaty of trade and friendship between the two countries"* (Life, *June 27, 1960). In view of very recent events, the time could hardly be riper for our review of a century (and more, as will be noted below) of relations between these two profoundly dissimilar yet mutually highly interesting nations and peoples. Thousands of Japanese have been and are in America; thousands of Americans have been to Japan. Yet the need to know each other well grows greater by the day. This is not the place to editorialize but merely to invite attention to a few of the many current books about Japan and its people and their history and their ways, and about our historic relationship with them. Knowledge and insight gained through reading will certainly encourage friendship and regard for this Asian country and people which has become vitally important to us as our nation—and people—are indeed to them.*

Meeting With Japan. By Fosco Maraini. Translated from the Italian by Eric Mosbacher. The Viking Press, New York. 1959. 467 pp., 154 photographs (36 in full color), many line drawings, endpaper maps. $8.50.

Living Japan. By Donald Keene. Doubleday & Company, Inc., Garden City, New York. 1959. 224 pp., 158 photographs, many in full color. $7.95.

Japanalia. By Lewis Bush. David McKay Company, Inc., New York. 1959. 311 pp., 25 pp. of photographs, 151 line drawings, endpaper maps in color. $5.50.

Japan: *Before Buddhism.* By J. E. Kidder, Jr. Ancient Peoples and Places series: Vol. 10. General Editor, Dr. Glyn Daniel. Frederick A. Praeger, New York. 1959. 282 pp., 108 photographs, frontis. in full color, 65 line drawings, 7 maps. $5.50.

Village Japan. By Richard K. Beardsley, John W. Hall, Robert E. Ward. The University of Chicago Press, Chicago. 1959. xv + 498 pp., 69 photographs, 2 line drawings, 45 text figs. $8.75.

Land Reform in Japan. By R. P. Dore. Issued under the auspices of the Royal Institute of International Affairs. Oxford University Press, London, New York, Toronto. 1959. xvii + 510 pp., 6 photographs. $8.80.

Zaibatsu Dissolution in Japan. By T. A. Bisson. University of California Press, Berkeley and Los Angeles. 1954. xi + 314 pp., 4 folded-sheet tables. $5.00.

Sources of the Japanese Tradition. Compiled by Ryusaku Tsunoda, Wm. Theodore de Bary, Donald Keene. "Introduction to Oriental Civilizations" series: Wm. Theodore de Bary, Editor. Columbia University Press, New York. 1958. xxvi + 928 pp. $7.50.

Japan and America: *From Earliest Times to the Present.* By Lawrence H. Battistini. The John Day Company, New York. 1954. x + 197 pp., 5 maps. $3.00.

The author of **Meeting with Japan,** Fosco Maraini, is "an observant Italian scholar, linguist, and photographer, who spent many years there as a teacher, as a wartime internee, and recently as a sympathetic traveler." A more inviting book can scarcely be conceived of, and it is to be warmly recommended as one with which to begin a literary journey through Japan. It is not given to many of us to live and travel long enough in another country to know it and its people well enough to transcend, to a degree, the limitations of our own background and national experience. the endpaper maps more decorative than geographical. The book was quite nicely produced in Tokyo.

Maraini's book is valuable because it "deals with the experiences of several years spent in a civilization profoundly different from our own during a period of revolutionary change and transformation." The author goes on in his Preface to editorialize on the theme that "he who spends a substantial part of his life among people whose history might have taken place on another planet ends by undergoing a subtle transformation. What at first sight seemed strange becomes normal; exotic beings become real men, women, and children. On the one hand you realize the great identity of man's terrestrial adventure, on the other the validity of looking at life and the world through eyes entirely different from our own. Both are vital in an age of shrinking distances and multiplying populations. How are we to live together if we do not know and understand each other?"

This book is paced for leisurely, reflective enjoyment and study. Here we travel vicariously in a way many of us would like to in person, given time and means, with good friends who make us more than guests in their homeland, with opportunity to look behind façades, to go beyond the obvious "tourist attractions" to the places and objects where the essential heart of the land is revealed to an inquisitive and sympathetic mind. And we take time for long looks into history, for digressions on the nature of dragons, the origin and development of pagodas, the peculiarities of the spoken language, the esthetics of ideograms.

Interwoven with travel, description, and history are threads of narrative—incidents in the lives of the author, his compatriots, and his Japanese friends and acquaintances—which suggest the inklings of a novel, its climax in the agonizing reality of wartime internment with its horrors of near-starvation. At least one reviewer, indeed, has expressed the feeling that Maraini has in places ridden too hard on certain brutal and negative aspects of Japanese life and character: each reader must judge for himself. There is some ugliness in all peoples and all places. For Maraini, "all . . . Japanese towns . . . are indescribably ugly." Yet a dominant, recurrent theme of the book is the beauty of landscapes, of temples and other creations—and the innate sense of beauty which the Japanese have along with their pragmatic acceptance of the hideousness of industrialization and the other crassnesses of modern civilization. He has seen and experienced much of the worst, and he doesn't gloss it; the thing is—this, if any, is the message of *Meeting With Japan*—he would have us see things whole and accept them, the differentnesses and the oneness of men the world around.

A superb combination of first-rate photographs and authoritative text—author Donald Keene is Associate Professor of Japanese at Columbia University, and the photographers include Eliot Elisofon, Marc Riboud, and Robert Capa—make **Living Japan** one of the most attractive presentations of this captivating country yet to appear. Professor Keene compares new ways with old, looks intimately at everyday life, goes fishing, farming, and into factories, discusses religion, democracy, and education, opens doors to the world of pleasure, and pays tribute to the creative artistry and craftsmanship of the Japanese people.

In **Japanalia** Lewis Bush, a Londoner who has lived and taught in Japan for many years, presents both the actual and armchair visitor with a handbook of geography, customs, history, mythology, arts, crafts, and just about anything you might come across to be located, identified, or explained. The fifth edition (first, 1938), it goes from an outline of Japanese history to alphabetical subject entries, several appendices, and an index which furnishes cross-references to things pertinent to main subject headings. The illustrations, both drawings and photos, are very good;

The archeology of the Japanese islands from an indicated Paleolithic beginning to a third century A.D. period of colossal and richly stocked tombs is authoritatively treated in **Japan: *Before Buddhism*** by Dr. J. Edward Kidder, who is Associate Professor of Art and Archeology at International Christian University, Tokyo. On a Fulbright grant in 1953–54, Dr. Kidder has been digging in Japan for ten years. It was only in 1949 that anything out of Japanese soil came to be recognized as Paleolithic: these were stone implements which served to bring previous questionable finds into focus. The important thing to the non-archeologist reader is that man has lived in these islands since his first shaping of recognizable tools; and his earliest known horizon here coincides geologically with a period during which he could have come from the Asian mainland *on foot*. Neolithic man may have come in dugout canoes from other island groups. First-comers and late-comers have been mixing strains ever since. From the Neolithic (beginning perhaps 4500 B.C.) onward, there has been production of vigorously styled, often intricately decorated objects—pottery, implements, figures, structures—culminating (for the period of this book) in the tomb sculptures preceding the coming of Buddhism to Japan. These things are very handsomely illustrated in line drawings and the splendid section of photographs. This *Japan* may open a new horizon for enthusiasts of the story of archeology, just as the islands themselves rather lately opened a new horizon in the worldwide pursuit of man's antiquity.

The phrase **Village Japan** perfectly expresses that which, despite accelerated urbanization, is still the norm of human life in these intensively developed and cultivated islands. In the book by that name a University of Michigan team—Richard K. Beardsley, professor of anthropology, John W. Hall, associate professor of history, Robert E. Ward, professor of political science—present what Harvard's Edwin O. Reischauer has called "the best and most detailed study of a Japanese social microcosm that has ever been produced in a Western language." For more than four years (1950–54) this sociological team had under more or less constant observation a Honshu village of "twenty-four houses clustered at the base of a pine-covered hill," Niiike (Neé-ee-eé-keh), whose 130 people are representative of the rice-growing rural half of Japan's population. "Their physical surroundings, daily activities, organized relations, and the beliefs and values that give meaning to their lives are reported here, as a starting point toward understanding the people of rural Japan" who still have a disproportionately large influence on the culture of the whole nation. Reading this book, one tends to forget statistics and the other impedimenta of sociological investigation, and to think of people, their feelings, personalities, problems, failures, and successes, coming to the conclusion, with the three scientists, that "Niiike's practices make up a reasonable, consistent, and more or less satisfying way of life under the conditions that prevail there." And doesn't that sum up all that any of us, anywhere, have a right to expect out of the deal of living?

The successes and failures of the American Occupation in Japan have been debated endlessly and will be for a long time to come. A successful postwar achievement for which America can take considerable credit is that of **Land Reform in Japan**; and R. P. Dore, Associate Professor of Asian Studies in the University of British Columbia, has turned in under that title a detailed study of the process and its outcome. The demand for such a reform was nothing new, and it came from within. It was something curiously "overlooked" by the Meiji Restoration and Reform which began to modernize Japan in 1868. The feudal system of tenancy kept its dead hand on agricultural development and rural progress in general. The cry for reform had been going up since long before World War II—from just about everybody but the landlords. Japan needed outside help to break its traditions; and of course SCAP was in a splendid position to provide it. The first half of this book gives the whys and wherefores of the ancient system and makes the case for reform; the second part "recounts the history of the reform itself, with its curious mixture of Japanese initiative and Occupation pressure." And finally an assessment is made of the effects of the reform, socially, politically, and economically. Based on detailed analysis of representative sample communities, the book is an important contribution to our understanding of what makes Japan the nation it is and is becoming.

On the other side of the ledger, the U.S. policy of "trust-busting" the notorious monopolies of Japan's Zaibatsu combines can only be written off as a failure. Zaibatsu is the word for the "money clique" of the great Tokugawa merchant families, the Mitsui, Mitsubishi, and Sumitomo, which came so close to forging their economic empire into a political one. **Zaibatsu Dissolution in Japan,** as examined in the 1954 book by T. A. Bisson, was to break forever the stranglehold of the iron hand in golden mail which launched the Japanese war machine on roads to conquest. Other motives entered in—there was competition with some of our interests, for instance. And the elements of failure were well mixed also: Asiatic antipathy to the individualism of free enterprise; pressure from certain American interests with cartel arrangements at stake. Zaibatsu still holds some control over Japan's destiny.

Sources of the Japanese Tradition is a compilation, with interspersed commentary, of significant Japanese thought as recorded from earliest historic times to the present. These are the philosophic springs for all major aspects of the national life, to be studied for insight on history.

Not 100 but 106 years ago, March 31, 1854, Commodore Perry signed for the U.S. the Treaty of Kanagawa which he had negotiated with the Shogunate within just a few months after his first "reopening" of Japan to the West. It was, in the words quoted in Lawrence H. Battistini's **Japan and America,** to effect "between the two countries a 'perfect, permanent, and universal peace and sincere and cordial amity,'" and to establish trade. The book is a compact summary of the events of the ensuing 100 years—excellent background for the reading of today's news. D.G.K.

Follow-up

Short item in Pacific Islands Monthly, *March 1960 [Pacific Publications Pty. Ltd., Sydney, Australia], illustrated with two photos by* PD *author Reece Discombe ["Voyage to Vanikoro," January-February 1960] of Vila, New Hebrides:*

RELICS GO TO VILA. Some of the relics from the wreck of La Pérouse's frigate, *Astrolabe,* wrecked on the reefs off Vanikoro, in 1788, are now permanently on display in Vila. The relics, which include lead ballast, lead used for melting to be made into shot, a cannon ball and a piece of timber, were presented by the French Navy to the Vila Cultural Centre at a colorful ceremony in Vila on February 5.

The band of the French Marine Infantry put on a band recital for the occasion, and extra colour was added by sappers in slouch hats from the Royal Australian Engineers, who happened to be present in Vila to help clean up after the hurricane [or two, that hit Vila in December 1959 and January 1960]. The relics were among many

Tsunami damage, Ofunado, Japan. (Kyodo News)

recovered by a combined expedition [the story of which is told in Reece Discombe's article], which included several Vila men. Other relics will be sent to Sydney.

Nature herself has seemed determined to keep alive the subject of tsunami *in recent weeks. Commonly called tidal waves whether tidal in origin or not, "Tsunami: Destructive Oceanic Waves" were discussed from several angles by Dr. Francis P. Filice in the September-October 1959 issue; and this column made its bow in May-June 1960 with a Scripps Institution of Oceanography news release describing "special long-period wave recorders" recently installed on several mid-Pacific islands. Nearly ten thousand nautical miles of ocean separate Japan from Chile, yet a Kyodo News Photo (above) of the coastal village of Ofunado, northeastern Honshu, shows houses completely destroyed. Drop a stone at the edge of a large pond, and watch the concentric waves travel all the way to the other side.*—EDITOR.

TIDAL WAVES, caused by violent earthquakes in Chile, raced across the Pacific Ocean and struck the islands of Japan at 3 A.M. on May 24. Hardest hit were Hokkaido, the northern island, and the northeastern portions of the main island of Honshu. In these areas waves rose as high as 18 to 21 feet. Miyagi prefecture was lashed by 22 successive series of tidal waves, called *tsunami* by the Japanese.

An estimated 41 persons were killed, 164 were missing and 384 were injured. The waves washed fishing boats hundreds of yards inland where they smashed through buildings in many places. Some vessels were left high and dry in village streets and had to be towed by military tanks back to the water. More than 24,000 homes were flooded, nearly 400 were washed away, and 1,000 others were destroyed.

Immediately after the waves struck, specially trained Japanese Self Defense Force troops went to work helping the injured and clearing up the debris. The men were assisted by such local groups as municipal firemen.

Tokyo, 1 June 1960. CLIFFORD V. HARRINGTON

EASY CHAIR COMFORT

LONG RUGGED WEAR

LEVI'S

AMERICA'S FINEST OVERALL

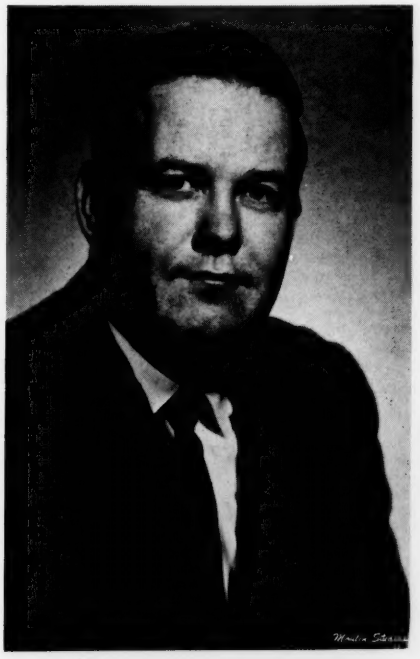
Since 1850

academically speaking

EXCEPT FOR A FEW CHILDHOOD YEARS spent playing along the banks of the Mississippi River, Dr. Joel F. Gustafson, the newly appointed Associate Director of the California Academy of Sciences, has lived in, studied in, worked in, and directed his best efforts to the State of California. Though his work has carried him farther afield as time has passed, the pivotal point of his life remains in the Golden State; and his interest in its natural history, its resources, and its need for conservation in many areas remains unchanged and unabated.

A perusal of but a few of the many organizations in which Dr. Gustafson is more than casually active accentuates this positive fact: Western Society of Naturalists, California Conservation Council, Marin Conservation League, National Audubon Society, American Institute of Park Executives, and the Point Reyes National Seashore Foundation, the very mention of which puts a militant spark in his eye since he is a proud and pledged gonfalon-carrier in the current contest to preserve one of California's most beautiful and culturally unique coastal spots which is now being threatened by bulldozers, concrete, and stucco.

For the eleven years preceding his appointment in the newly-created position at the Academy, Dr. Gustafson was on the staff of the Department of Biological Science



at San Francisco State College. He served the College both in and out as teacher, lecturer, committeeman, conservationist, and, separately enough, designer-architect, in that he had a large share in the plans for the arrangement of the science hall then abuilding. When time permitted, he wrote articles for newspapers and magazines, planned and appeared on television programs, spoke before many and varied groups of citizens interested in science and natural history, and yet had time enough left over to become one of the founders of the San Francisco Zoological Society and its Executive Secretary.

In 1953, he was named one of San Francisco's 100 Leaders of Tomorrow, a project sponsored by the San Francisco Chamber of Commerce and *Time* magazine.

While at San Francisco State, Dr. Gustafson led many study groups of college students on week-long trips through California and Nevada studying habitat associations. In 1958, he organized what is considered to be one of the first student science tours of Europe, taking with him 15 student charges who looked into various aspects of Western Europe's natural history, and through lectures arranged at leading universities, inquired into the social and political relationships of availability and use of its various natural resources. For several years he supervised graduate projects in fisheries biology and management. Grants from the Department of Fish and Game and from the Associated Sportsmen of San Francisco supported a four-year study of Lake Merced.

The diversity in Dr. Gustafson's past career will hold him in good stead at the Academy where the duties assigned him are many and varied. He will act as administrator for the Morrison Planetarium, the Steinhart Aquarium, the Museum Exhibits and the Academy's Television Department, and will be responsible for the operation and maintenance of the Academy buildings in general.

"It's a wonderful opportunity," Dr. Gustafson said in conversation. "For all these years, the Academy has been serving a great purpose and I am proud to become part of it. I'm convinced that in this age of scientific and political complexity, we must find more and more ways of getting the general public involved in science and scientific information, for every time we turn around in this unpredictable world of ours, a brand-new need *to know* arises. I don't know why it is, but people always seem to shy away from the things they don't quite understand, and science is one area where they seldom give themselves a break.

"Science shouldn't overwhelm anyone. Almost everyone has more latent ability in science than he ever recognizes. At the Academy, we have a great opportunity to give our members and our visitors the confidence they need to help them identify themselves within certain scientific areas, and by doing so, increase their understanding. We can interpret science and natural history, where possible, in our exhibits, in our wonderful TV program, 'Science in Action,' in fact, in everything we do which is concerned with public information. It is going to be a privilege to contribute what I can in furthering the Academy's purpose."

Dr. Gustafson met his charming wife, Vivian, when they were attending Tamalpais High School. An A.B. from San Jose State, an M.A. and a Ph.D. in Biology from Stanford followed, and concurrently, the birth of their three children, Diana, Brian, and Ronnie.

The Gustafsons live in Mill Valley across the Golden Gate, where the second of two "five year plans" for the building of their own home is now in process, a two-level house which fits snugly and pleasingly into the natural contours of an oak-studded Marin hillside with all the oaks left intact. Dr. Gustafson indulges such leisure as he has in native gardening and carpentry and "riding herd" on a procession of pets which his three children parade through their lives. And sometimes there is time for a game of chess, friends in for a barbecue (for which he makes the sauces and the marinades), an occasional fishing trip, or, while reading, the pure pleasure of listening to a record player stacked with symphonic music. H. R.

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